TC

Thin Client Web
– Stand-alone / Embedded Linux –

Operating Instructions

Issue 1.01

24.7.2008

MSC Tuttlingen GmbH
Rudolf-Diesel-Straße 17
D-78532 Tuttlingen
Tel. +49 7461 925 200
Fax +49 7461 925 268
E-Mail sales@msc-tuttlingen.de
www.msc-tuttlingen.com

General Notice

Safety guidelines

This document contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger.

Immediate danger

to life and limb of personnel and others.

Non-compliance will cause death or serious (crippling) injury.

Hazardous situation

to life and limb of personnel and others.

Non-compliance may cause death or serious injury.

Potentially hazardous situation

Non-compliance may cause slight injury;

possible damage to property.

Notes on correct handling

Non-compliance may cause damage to the product and/or to parts/items in the vicinity.

Important information about the product, the handling of the product, or the part of the documentation onto which is supposed to be made especially attentive.

Environmental protection

Non-compliance may have an impact on the environment.

Intended use

The products of MSC Tuttlingen GmbH may only be used for the applications described in the technical documents, and only in connection with devices or components from other manufacturers which have been approved or recommended by us.

Start-up must not take place until it is established that the machine which is to accommodate this component conforms to the guideline 98/37 EC.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Qualification of personnel

Only qualified personnel may carry out the following activities on the products:
installation, commissioning, operation, maintenance.

Qualified persons in accordance with the safety guidelines are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Disclaimer of liability

We have checked the contents of this document for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

EMC directive 2004/108/EC

The following applies to this product of MSC Tuttlingen GmbH:

TC complies with the requirements of the EMC directive 2004/108/EC on basis of the standards following in chapter "Technical Data".

The EC declarations of conformity and the related documentation will be maintained at the following address for inspection by the responsible officials in accordance with article 10(1) of the above stated EC directive:

MSC Tuttlingen GmbH
Rudolf-Diesel-Straße 17
78532 Tuttlingen

Germany

Areas of use

Products of MSC Tuttlingen GmbH meet the applicable, harmonized, European standards for the respective area of applications.

Warranty

For the devices of MSC Tuttlingen GmbH, the agreements determined in the General Terms and Conditions (AGB) are valid.

Fitting conditions

The fitting conditions and safety notes in the submitted document must be adhered to when commissioning and operating the products.

Trade names and/or trademarks

All hardware and software names are trade names and/or trademarks of the respective manufacturer.

Copyright

Every user documentation is intended for the operator and the operator’s personnel only.
The transmission and reproduction of this document and the exploitation and communication of its contents are not allowed without express authority. Offenders will be liable for damages.

Contents

1 Characteristics 5
1.1 Features 5
1.2 Use 6
1.3 Nomenclature 6
1.4 Overview 7

2 Installation 11
2.1 Unpacking and checking the delivery contents 11
2.2 Storing and transporting 11
2.3 Installing 11
2.3.1 Temperature 12
2.3.2 Ventilation 12
2.3.3 Installation position 13
2.3.4 Mounting and sealing 14
2.4 Providing readiness of operation 15
2.5 Connecting to power supply 16
2.6 Using peripheral devices 17

3 Commissioning and Operating 19
3.1 Expanding the TC 19
3.1.1 General requirements 19
3.1.2 Opening the device and closing it again 20
3.1.3 Back-up battery 21
3.1.4 Flash memory 22
3.2 Connecting peripheral devices 23
3.2.1 Interfaces 23
Access to ports 23
Identification label 24
Connector housing TC for support arm system according to VESA 100 standard / IP 65 24
3.2.2 Peripherals 24
Keyboard 24
Mouse 24
Plugging the keyboard and mouse 25
Booting from USB stick 25
Ethernet network 25
3.3 Operating the TC 26
3.3.1 Membrane keyboard 26
Function keys 26
Status LED 26
3.3.2 Touchscreen 27
3.3.3 Cleaning 27

4 Operating system and Software 29
4.1 Characteristics 29
4.1.1 Switch-on behavior 29
4.1.2 Booting process 30
4.1.3 Remote configuration 30
4.2 Operating elements 31
4.2.1 Soft keyboard 31
4.2.2 Touch calibration 31
4.2.3 Tools 32
4.2.4 Stand-by 32
4.3 System configuration 33
4.3.1 Display 34
4.3.2 Touch 35
4.3.3 Network 36
4.3.4 Pass words 37
4.3.5 Update 37
4.3.6 Language setting 38

4.4 Connection establishment ... 39
4.4.1 Manual connection establishment ... 39
4.4.2 Automatic connection establishment ... 40
4.5 Connection configuration ... 41
4.5.1 Web connection ... 41
4.5.2 RDesktop connection (Windows Terminal Services) ... 42
4.5.3 VNC connection ... 43
4.5.4 Configuring the VNC server ... 44

5 Technical Data ... 47
5.1 General ... 47
5.2 Device-specific ... 50
5.3 External connections ... 51
5.3.1 USB ports ... 51
5.3.2 Ethernet connection ... 51
5.3.3 Microphone input and audio output ... 51
5.3.4 Interfaces at the connector housing ... 52
Power ... 52
Ethernet ... 52

6 Mechanical Dimensions ... 53
6.1 TC with 12.1" display ... 53
6.1.1 Front ... 53
6.1.2 Device dimensions ... 54
TC12-S [stand-alone] ... 54
6.1.3 Adapter plate ... 56
6.2 TC with 17.0" display ... 57
6.2.1 Front ... 57
6.2.2 Device dimensions ... 58
TC17-S [stand-alone] ... 58
6.2.3 Adapter plate ... 60
6.3 Adapter plates TC for standard flange systems ... 61
6.3.1 Support arm system according to VESA 100 standard ... 61
6.3.2 Rittal CP-S support arm system ... 62
6.3.3 Bernstein CS-2000 SL housing coupling ... 63
6.3.4 ROSE GT48/2 flange (angle) coupling ... 64
6.4 Connector housing TC for support arm systems according to VESA 100 standard / IP 65 ... 65
6.5 Pedestal TC ... 66

Appendix

7 Licensing ... 67
7.1 Licensing regulations ... 67
7.1.1 Free software packages ... 67
7.1.2 General terms for disposal of software products ... 68
7.1.3 Guarantee regulations for free software ... 68
7.2 GNU General Public License (GPL) Version 2.0 ... 69
7.3 GNU Lesser General Public License (LGPL) Version 2.1 ... 75
7.4 BSD Copyright Notation ... 83
7.5 ZLib Copyright Notation ... 84

Table of Figures

Fig. 1-1: Example for order code....6
Fig. 1-2: Overview – 12.1" display....7
Fig. 1-3: Overview – 17.0" display....8
Fig. 1-4: Overview – Accessories [adapter plate]....9
Fig. 1-5: Overview – Accessories [connector housing]....9
Fig. 1-6: Overview – Accessories [pedestal]....10
Fig. 2-1: Ventilation....12
Fig. 2-2: Permissible installation positions....13
Fig. 2-3: Mounting and sealing....14
Fig. 2-4: Connecting to 24 VDC power supply....16
Fig. 2-5: Plug-in connection for 24 VDC....17
Fig. 3-1: Opening the device and closing it again....20
Fig. 3-2: Connections to periphery....23
Fig. 3-3: Identification label....24
Fig. 3-4: Connections at the connector housing....24
Fig. 3-5: USB stick for booting on USB-1 (port 0)....25
Fig. 3-6: Front view [e.g. TC17-S]....26
Fig. 3-7: Membrane keyboard....26
Fig. 4-1: Display manager after booting....30
Fig. 4-2: Soft keyboard....31
Fig. 4-3: Tools menu....32
Fig. 4-4: System configuration....33
Fig. 4-5: Storing of modifications....33
Fig. 4-6: Display – Settings....34
Fig. 4-7: Touch – Settings....35
Fig. 4-8: Network – Configuration....36
Fig. 4-9: Passwords – Entries....37
Fig. 4-10: Update – Select image and start mode....37
Fig. 4-11: Language setting....38
Fig. 4-12: Connection establishment....39
Fig. 4-13: Example for Web connection with 'Automatic login'....41
Fig. 4-14: Example for RDP connection....42
Fig. 4-15: Example for VNC connection....43
Fig. 4-16: Ultra VNC server....44
Fig. 4-17: TightVNC server....45
Fig. 5-1: USB....51
Fig. 5-2: Ethernet....51
Fig. 5-3: Microphone input and audio output....51
Fig. 5-4: Connector housing – Power....52
Fig. 5-5: Connector housing – Ethernet....52
Fig. 6-1: TC12-S [MSC] – Front....53
Fig. 6-2: TC12-S [neutral] – Front....53
Fig. 6-3: TC12-S [stand-alone] – Device dimensions....55
Fig. 6-4: TC17-S [MSC] – Front....57
Fig. 6-5: TC17-S [neutral] – Front....57
Fig. 6-6: TC17-S [stand-alone] – Device dimensions....59
Fig. 6-7: Adapter plate TC for support arm system according to VESA 100 standard....61
Fig. 6-8: Adapter plate for Rittal CP-S support arm system....62
Fig. 6-9: Adapter plate for Bernstein CS-2000 SL housing coupling....63
Fig. 6-10: Adapter plate for ROSE GT 48/2 flange (angle) coupling....64
Fig. 6-11: Connector housing TC for support arm systems according to VESA 100 standard / IP 65....65
Fig. 6-12: Pedestal TC VESA....66

Note

These TC [Web] operating instructions describe the standard versions of the TC [Web] Thin Client.

Customized variants are also based on these components.
If necessary, a description of the significant special particulars is attached.

Please read the operating instructions before the first use, and keep them carefully for the later use.

They are written for customers with prior knowledge in PC technology and automation.

Purpose

These operating instructions are part of the Technical Documentation of the TC Thin Client. They provide service personnel and system advisors with the information required to install, commission, operate and maintain the TC.

TC [Web]
Operating Instructions
Article no. 69 00 134

© Copyright MSC Tuttlingen GmbH, 78532 Tuttlingen, 2008
Subject to change without notice.

1 Characteristics

1.1 Features

Remote solutions are becoming more and more important for the operation and visualization of machines. Particularly the central software installation and maintenance of a server lead to considerable cost savings compared to applications with several panel computers with complete installation. In addition, the increasing circulation of Web servers in PLC and SCADA systems lead to further savings for the client license costs.

- Unit for usage at the machine "on site"
  - Stand-alone (add-on unit)
    Mechanically stable aluminum housing
    Flange mounting for support arm and pedestal
    Protection class: IP 65 all-around
  - Aluminum front panel, surface powder-coated
  - Touchscreen (analogue-resistive), four function keys, LED
  - TFT color display in different sizes and resolutions
  - Cooling: Fanless
  - Supply voltage 24 VDC
- Base board for integration of CPU module at ETX form factor
  - CPU Geode LX800 on ET(e) module
  - SDRAM
  - Compact-Flash card
  - Onboard graphics, shared memory
- Interfaces to peripherals
  - 2 x USB 2.0 at front, covering IP 65
  - 2 x USB 2.0 at rear
  - Ethernet (RJ-45 socket): 10/100 Base-T
- Software
  - Operating system based on Embedded Linux
    Web/VNC client, RDP applications
- Test certificate: CE, UL-Recognized-Component

1.2 Use

TC operation terminals are completely configured for most server environments e.g. RDP, Web or extended configurations. The connection to the server will be established via Ethernet.

The devices are characterized by high operational reliability at rough conditions. The TC is a stand-alone unit, IP 65 all-around, and prepared for support arm or pedestal mounting. By default, it features four function keys.

1.3 Nomenclature

The identification of the different versions of TC type series depends on

- display size,
- manner of mounting.

The order code describes more in detail the respective equipment.

For example:

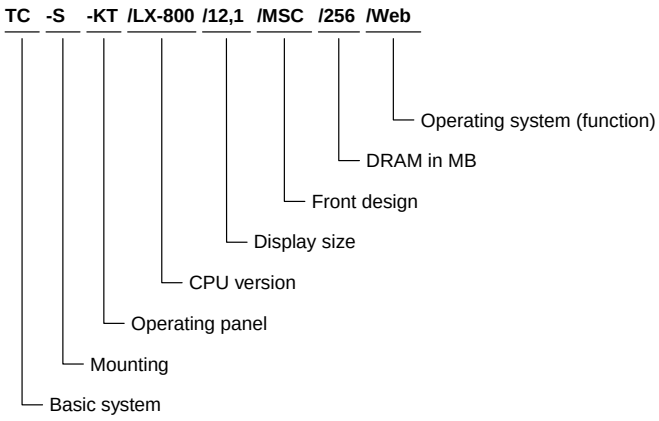


Fig. 1-1: Example for order code

You will find the available components in the chapter "Technical Data".

Each device is determined by an article number.

1.4 Overview

12.1" display

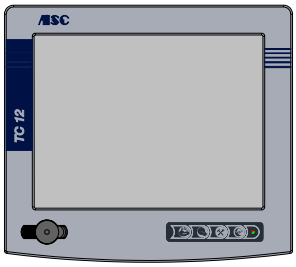
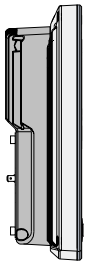
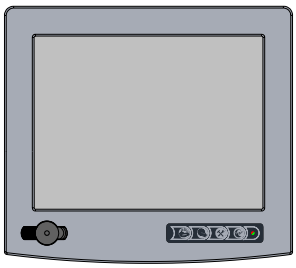
Device type	Front panel	Side view
TC12-S Stand-alone Front design MSC Order code: TC-S-KT/LX-800/12,1/MSC/256/Web	 Display: 12.1" Dimensions: 315 mm x 280 mm	 Add-on unit Depth: 85 mm Mounting at support arm systems (e.g. with aid of an adapter plate)
TC12-S Stand-alone Front design neutral Order code: TC-S-KT/LX-800/12,1/N/256/Web	 Display: 12.1" Dimensions: 315 mm x 280 mm	

Fig. 1-2: Overview – 12.1" display

Overview (continuation)

17.0" display

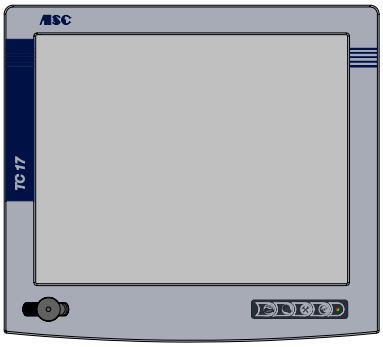
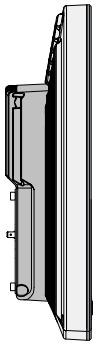
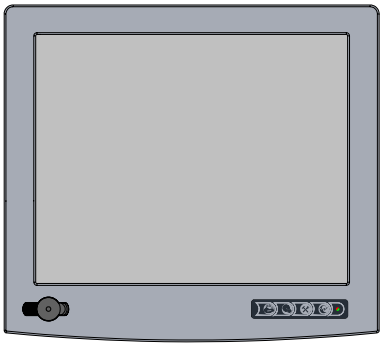
Device type	Front panel	Side view
TC17-S Stand-alone Front design MSC Order code: TC-S-KT/LX-800/17,0/MSC/256/Web	 Display: 17.0" Dimensions: 410 mm x 370 mm	 Add-on unit Depth: 95 mm Mounting at support arm systems (e.g. with aid of an adapter plate)
TC17-S Stand-alone Front design neutral Order code: TC-S-KT/LX-800/17,0/N/256/Web	 Display: 17.0" Dimensions: 410 mm x 370 mm	

Fig. 1-3: Overview – 17.0" display

Overview (continuation)

Accessories

Several adapter plates and connector housings for the mounting of different systems on the rear of the TC are available.

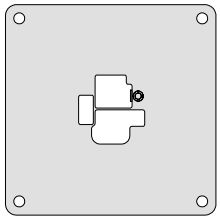
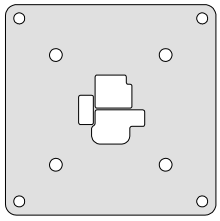
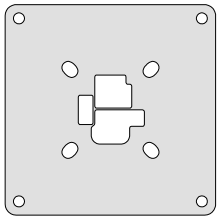
Adapter plate TC		
Article no. 6114674	**Article no. 6114795**	**Article no. 6114796**
VESA 100	Bernstein CS-2000 SL housing coupling	Rittal CP-S support arm system ROSE GT48/2 flange (angle) coupling
		

Fig. 1-4: Overview – Accessories [adapter plate]

Connector housing TC for support arm systems according to VESA 100 standard, protection class IP 65		
Article no. 6286137	**Article no. 6286138**	**Article no. 6286139**
24 VDC and Ethernet / without USB	24 VDC and Ethernet / 1 x USB	24 VDC and Ethernet / 2 x USB

Fig. 1-5: Overview – Accessories [connector housing]

Overview (continuation)

Accessories

According to the demand, a pedestal with suitable adapter is available for the fixing at the TC.

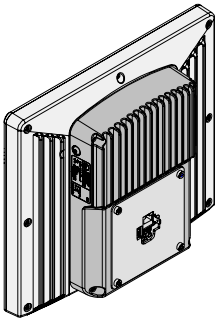
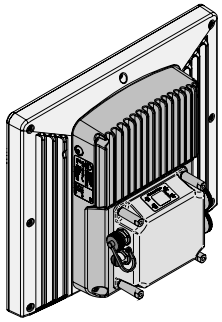
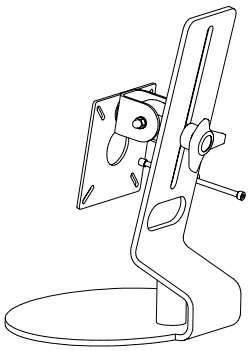
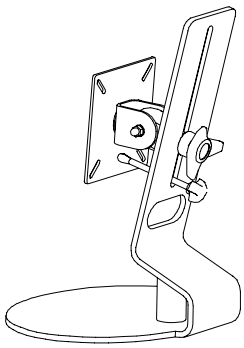
Pedestal	
for the fixing at a TC with adapter plate VESA 100 (art. no. 6114674)	for the fixing at a TC with connector housing (art. no. 6286137, 6286138, 6286139)
	
Pedestal TC VESA 100	**Pedestal TC connector housing**
Article no. 6286141	**Article no. 6286140**
	

Fig. 1-6: Overview – Accessories [pedestal]

2 Installation

2.1 Unpacking and checking the delivery contents

Unpacking

- Check the packaging of the TC for transport damages.
- Remove the packaging carefully in order to avoid damages.

Save the original packaging for a possible new transportation of the TC.
Keep also the supplied documents.

Checking

- Check the contents of the packaging for visible transport damages.
- Check the contents for completeness by means of the delivery note.

2.2 Storing and transporting

The TC is constructed solidly indeed. The included components are however sensitive to excessive shocks and impacts.

Therefore protect the TC against too great mechanical stress.

The device must be transported in its original packaging, completely with all shock-absorbing parts.

Ensure that no condensation is formed on the device when it is stored/transported during cold weather periods or when it is exposed to extreme deviations of temperature.

2.3 Installing

The TC is approved for operation in closed rooms.

Please adhere also to the chapter "Technical Data" during installing the TC.

You've got to observe the following items in order to effect a trouble-free operation of the TC and to avoid damages.

2.3.1 Temperature

- Prior to commissioning:
  - Allow the device time to adjust to room temperature.
  - If condensation has formed, do not turn the device on until it is absolutely dry.
- Prevent overheating during operation:
  Protect the device from direct radiation by sunlight or other heat sources.
- The max. ambient temperature during operation must not exceed the value specified in the chapter "Technical Data".

2.3.2 Ventilation

- The TC is a closed system.
- There are no ventilation holes for the air exchange with the surrounding air. The heat arising in the interior is dissipated to the environment by means of large-area cooling fins.
- Take care of a suitable air circulation.

Example: TC12-S [stand-alone] with adapter plate for VESA 100
The following is valid correspondingly for other versions.

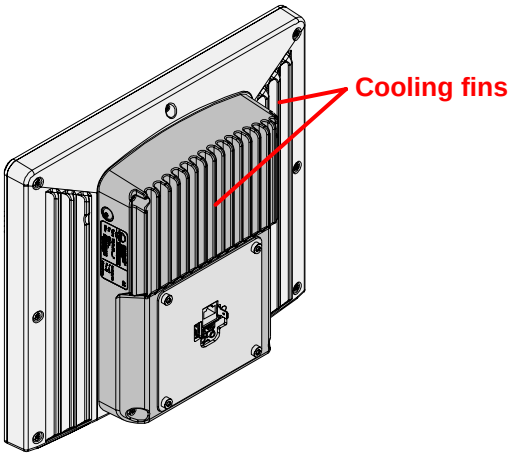


Fig. 2-1: Ventilation

2.3.3 Installation position

The vertical installation as well as deviations up to ± 30° in the below indicated directions are permitted.

For deviations from vertical installation it is to be considered that no accumulation of heat arises in the interior of the housing.

Example: TC12-S [stand-alone] with adapter plate
The following is valid correspondingly for other versions.

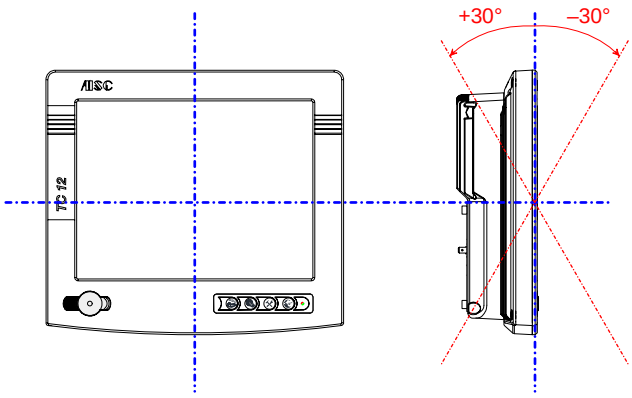


Fig. 2-2: Permissible installation positions

2.3.4 Mounting and sealing

Stand-alone = Add-on unit

TC as an add-on unit can be mounted at support arm systems of different manufacturers, see in chapter "Characteristics" the section "Overview".

For mounting at a housing coupling (an equipment flange) the adapter plate on the rear of the housing is removable.

The dimensions of the adapter plate, you will find in the chapter "Mechanical Dimensions" in the section "Adapter plates TC for standard flange systems".

- Loosen the four screws [M5x8, hexagon socket] of the adapter plate.
  Remove the plate from the rear-mounted part of housing.
- Use the appropriate adapter plate for the standard flange system or, if not appropriate, drill holes into the adapter plate for the connection with the housing coupling.
- Attach the housing coupling to the adapter plate.
- Screw on the adapter plate with mounted equipment flange on the rear-mounted part of the housing.

A connector housing for the fixing at a support arm system according to VESA 100 standard is an alternative to the adapter plate. Connectors with protection class IP 65 are wired to outside for 24 VDC, Ethernet and USB.

Example: TC12-S [stand-alone]
The following is valid correspondingly for other versions.

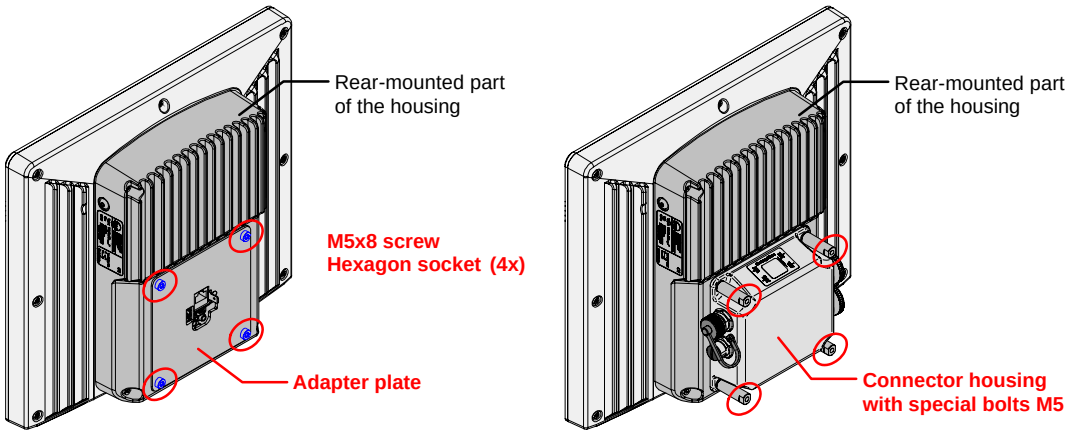


Fig. 2-3: Mounting and sealing

Notes:

- When mounting an adapter plate with attached housing coupling it is absolutely to be noted that the fixing elements of the coupling on the adapter plate do not contact the electronics being under that.
- Protection class IP 65 of the housing is only guaranteed, if the sealing on the rear-mounted part of housing is not damaged during removal and fitting of the adapter plate, and the sealing remains positioned correctly.
- In addition it is to be ensured that the required tightness is obtained when mounting the equipment flange at the adapter plate.

2.4 Providing readiness of operation

Fail-safe connections for ensuring trouble-free operation:

Use only shielded cables and metallic connectors
for all signal connections.

Screw down or lock all plug connectors.
This improves the electrical shielding.

Do not install signal lines in the same cable ducts
as high voltage lines.

Before commissioning the system
all cable connections must be tested.

It has to be guaranteed that all voltages and signals
correspond to the required values.

Safe derivation of electric malfunctions:

Device and cabinet are to be connected on maximally short way
with a central grounding point.

Use a connection with maximally low impedance
between device and cabinet.

Carry out the grounding connection with green-yellow cable
with at least 2.5 mm² cross section.

Interference emission:

according to EN 55022:1998 + A1:2000 + A2:2003 Class A

This is a device of the class A.

This device can cause interferences in the living area;
in this case it can be demanded from the operator to carry out adequate measures.

Especially for devices with 100-240 VAC supply:

Notice:

Device must only be connected to a socket-outlet with grounding contact.

For complete disconnection from mains, the power plug must be unplugged.

Note:

Ensure that the socket-outlet with grounding contact of the internal installation is
freely accessible and is as close as possible to the device.

For installation in a cabinet, a central power disconnect switch must be provided.

The connector of the connection line to the supply voltage is a disconnecting appliance
according to EN 60950.

Pull the power plug before opening the device!

Especially for devices with 24 VDC supply:

Notice:

Device may be operated only with safe extra low voltage
(extra low function potential with safe disconnection).

The power transformer must correspond to the valid specifications.

2.5 Connecting to power supply

Mains supply voltage 24 VDC

Warning

24 VDC (18..36 VDC) supply for integrated DC/DC transducer.

The voltage applied must meet the requirements for a safe extra low voltage (SELV) according to EN 60950!

Attend to "+" and "–" polarity!

Before connecting to mains

Warning

Does available voltage conform to the standard voltage requirement?

Functional grounding: Connect grounding point with cabinet ground!
Flat pin 6.3x0.8 at the adapter plate on the rear of the housing

View on the rear of the housing:

Example: TC12-S [stand-alone] with adapter plate for VESA 100
The following is valid correspondingly for other versions.

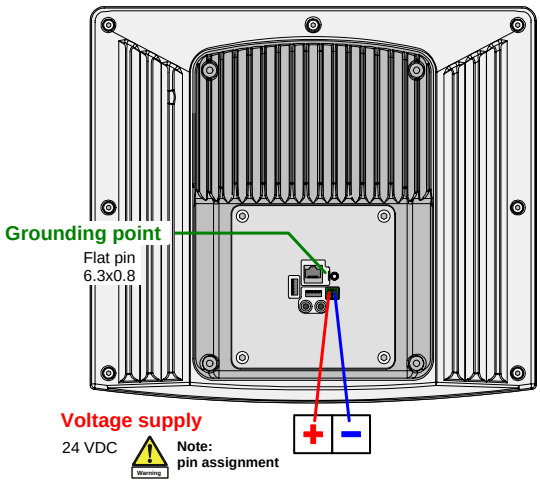


Fig. 2-4: Connecting to 24 VDC power supply

Connection cable

For connecting the power supply we recommend:

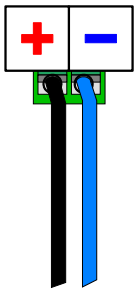
Cu wire 75 °C

Cross-section 2.5 mm²

Tightening torque 0.5..0.6 Nm
(with screws at the plug component)

Plug-in connection for 24 VDC

on the rear of the housing



Plug component
FMC 1,5/2-ST-3,5
2 pin, pitch: 3.5 mm
Phoenix Contact

Fig. 2-5: Plug-in connection for 24 VDC

- Attach the supplied connector onto a 2-wire cable and plug it into the socket on the rear of the housing. Consider "+" and "–" polarity.
- Connect the supply cable to a 24 V supply voltage that meets the requirements for a safe extra low voltage (SELV) according to EN 60950.

The device is ready for 24 VDC operation.

Plug-in connection at the connector housing

If a connector housing is attached on the rear, the above described plug-in connector is not accessible.

Placement and assignment of the connections for the 24 VDC power supply are to be found in the chapter "Technical Data" in the section "Interfaces at the connector housing".

2.6 Using peripheral devices

The devices of MSC Tuttlingen GmbH offer by means of their peripheral interfaces the possibility to connect different components.

When using standard peripheral devices (e.g. at the USB port) you have to note that their electromagnetic interference immunity is often only sufficient for office environments.

They are not suitable however for operating in the industrial environment!

This page is left intentionally blank!

3 Commissioning and Operating

3.1 Expanding the TC

Note:

TC is a completely configured device.
An hardware expansion is not possible.

If necessary only the replacement of
Compact-Flash card and back-up battery is required.

3.1.1 General requirements

Limitation of liability

All technical specifications and approvals apply only to expansions approved by MSC Tuttlingen GmbH.

No liability can be accepted for impairment of functions caused by the use of devices and components from other manufacturers.

All modules and components are electrostatically sensitive.

The ESD notes are absolutely to be considered.

The opposite symbol indicates the use of electrostatically sensitive modules.

Precautions

Electronic components are extremely sensitive to electrostatic discharge. Therefore, certain precautionary measures are necessary when handling these modules. Please refer to the directive for Electrostatically Sensitive Devices (ESD guideline).

- Before plugging in or unplugging any components, disconnect the TC from the power supply.
- Before plugging in the connection cables, the static charge of your body, the TC and the cables must be brought to the same level. To do this, briefly touch the metal housing.
- Discharge the electrostatic charge from tools you are using.
- Wear a grounding strip when handling components.
- Leave components in their packaging until they are to be installed.
- Components should only be held at the edges – never touch connection pins and conductive tracks.
- Never operate the TC with the housing open.

Notice:

Only service personnel is allowed to open the TC.

3.1.2 Opening the device and closing it again

Caution

Notice:

Only remove the adapter plate for exchanging Compact-Flash card and battery.

TC should remain closed. Do not loosen any further screws at the housing.

Example: TC12-S [stand-alone] with adapter plate for VESA 100
The following is valid correspondingly for other versions.

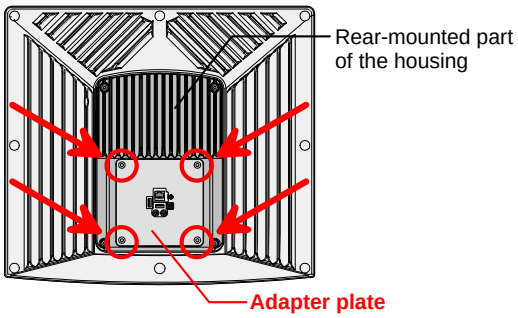


Fig. 3-1: Opening the device and closing it again

Removing the adapter plate

Before opening:

Separate the device from supply.

Disconnect all connection cables from the TC.

- Loosen the four screws at the adapter plate:
  M5x8 Hexagon socket
- Remove the adapter plate to the back.

After having removed the adapter plate, Compact-Flash card and battery on the base board are accessible and can be exchanged if necessary.

Mounting the adapter plate

While installing:

Pay attention to integrity and correct position of the sealing on the rear-mounted part of housing. Protection class IP 65 all-around!

Guarantee contact between EMC spring clips and adapter plate.

- Put in the adapter plate so across the interface connections that the EMC spring clips at the USB sockets press against the adapter plate from below and guarantee the contact with that.
- Set the four screws through the holes in the adapter plate into the threads in the rear-mounted part, and tighten them again.

Device with connector housing

At the connector housing the four special bolts are to be loosened in order to remove the connector housing. Take special care of the internal wiring.

3.1.3 Back-up battery

The battery that is installed on the base board provides Real Time Clock and CMOS memory with a current, in order to permanently save system information, even if the board is separated from the supply.

Type	CR2032
Electrochemical system	Primary Lithium cylindrical and button
Nominal capacity	230 mAh
Nominal voltage	3 V
Diameter	20 mm
Height	3.2 mm
Weight	3 g

Replacing the battery

When the charge is too low or the battery is empty, the data stored in the CMOS RAM (e.g. date and time) might not be accurate.

Then the Lithium battery must be replaced.

To replace the battery, follow these steps:

- Observe the precautions in section "General requirements".
- Open the housing as described in section "Opening the device and closing it again".
- With a medium flat-bladed screwdriver, gently pry the battery enough to free the battery from its socket.
- Install the new battery in the socket, orienting the "+" face-up.
- Close the TC again as described in section "Opening the device and closing it again".

Notice:

Incorrect replacement leads to danger of explosion.

The battery may be replaced only with an identical battery or with a type recommended by the manufacturer.

Ensure that you insert the battery in the right way (see polarity).

Note:

Do not throw Lithium batteries into the household waste. They must be disposed of in accordance with local regulations concerning special waste.

3.1.4 Flash memory

The base board of the TC is firmly equipped with a Compact-Flash card.

The Compact-Flash card is used as a storage medium exclusively for system information.

Notice:

Do not "save" any data to the storage medium if a supply voltage failure occurs! The variable voltage in such an event causes uncontrolled writing to the storage medium, data files may be overwritten or deleted.
UPS (Uninterruptible Power Supply) prevents loss of data!

Exchanging the Compact-Flash card

If data are destroyed on the Compact-Flash card, it is to be replaced by a new one, that can be got by MSC Tuttlingen GmbH.

To replace the Compact-Flash card, follow these steps:

- Observe the precautions in section "General requirements".
- Open the housing as described in section "Opening the device and closing it again".
- Remove the damaged Compact-Flash card and insert the new card.
- Close the TC again as described in section "Opening the device and closing it again".

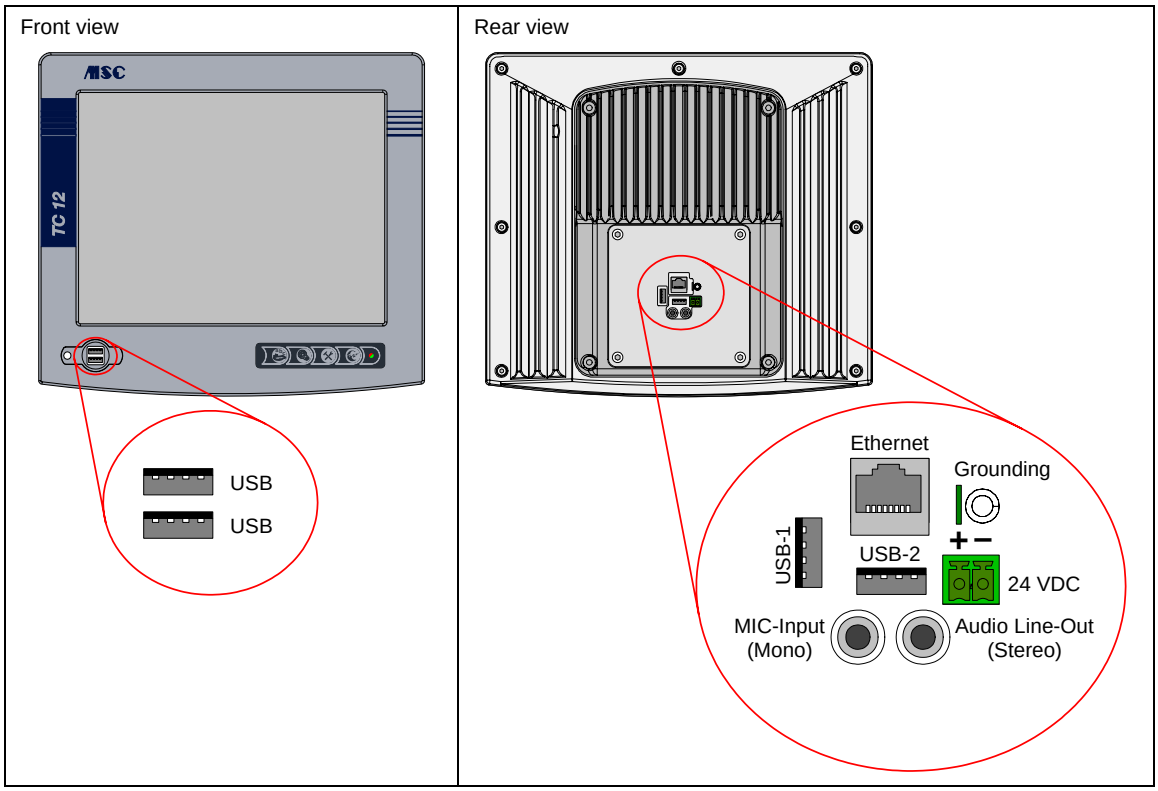
3.2 Connecting peripheral devices

3.2.1 Interfaces

Access to ports

Connections to peripheral devices are placed on the front under the covering and on the rear of the housing.

Example: TC12-S [stand-alone] with adapter plate for VESA 100
The following is valid correspondingly for other versions.



Interface	Connector type	Annotation
USB port	USB type A, 4 pin	2 x on the front, under the covering
USB port	USB type A, 4 pin	2 x on the rear
Ethernet	RJ-45 socket, 8 pin	on the rear
MIC-Input (Mono)	Socket for switchboard plug 3.5 mm	on the rear
Audio Line-Out (Stereo)	Socket for switchboard plug 3.5 mm	on the rear

Fig. 3-2: Connections to periphery

Notice:

During operation: Do not connect or disconnect any plugs!
When connecting peripheral devices, pay attention to their industrial compatibility!
Configuration of the connections, see identification label!
Terminals are standardized contacts with known default assignments.

Identification label

The identification label inside on the adapter plate or the connector housing shows the configuration of the interfaces.

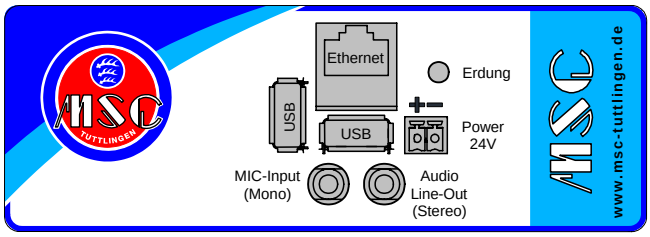


Fig. 3-3: Identification label

Connector housing TC for support arm system according to VESA 100 standard / IP 65

Example:

Connector housing TC with the connections 24 VDC and Ethernet / 2 x USB

Article no. 6286139

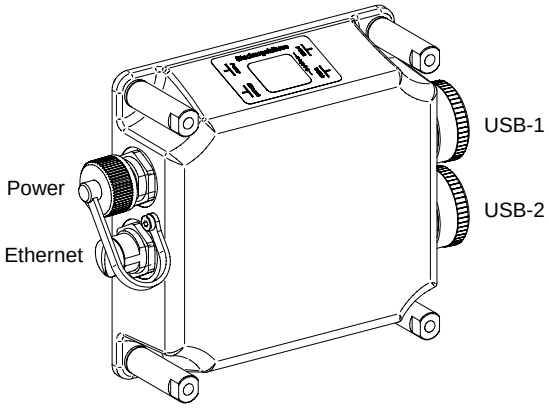


Fig. 3-4: Connections at the connector housing

3.2.2 Peripherals

Notice:

For the process operation external keyboard and external mouse must be provided with the CE mark (for industrial environment!).

External keyboard, membrane keyboard and/or touchscreen may be operated in parallel.

Keyboard

The TC is designed to connect a USB keyboard.
It can be connected to one of the USB ports.

Mouse

The TC is designed to connect a USB mouse.
It can be connected to one of the USB ports.

Plugging the keyboard and mouse

Notice:

Plug-in keyboard and/or mouse only after the switch-on of the device!

If keyboard and/or mouse are already inserted on the USB interfaces during the switch-on of the device, they are not always functional.

After having inserted them again with the device switched-on, they are supplied correctly with supply voltage and are available for operation.

1. Switch-on the device.
2. Plug-in keyboard and/or mouse.

Booting from USB stick

Notice:

Put USB stick on USB-1 for booting!

If the TC has to boot from a USB stick, the stick must be plugged on USB-1.

- USB-1 is located on the rear side of the housing and is the left, vertically installed USB interface.
- With the connector housing mounted on the rear of the housing, USB-1 is the upper one of the two (if available) USB interfaces.

USB-1 corresponds with port 0 on the CPU platform which the system searches for booting. All other USB interfaces are not suitable for booting.

Example: TC12-S [stand-alone] with adapter plate for VESA 100
The following is valid correspondingly for other versions.
Rear side of the housing:

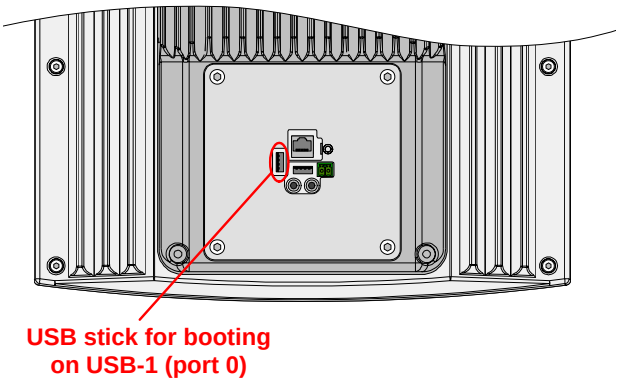


Fig. 3-5: USB stick for booting on USB-1 (port 0)

Ethernet network

The TC can be connected to a computer network via the RJ-45 socket "Ethernet".

Ethernet is a standard for local networks. Twisted-pair cables are used for networking the computers.

3.3 Operating the TC

Example: TC17-S [stand-alone]
The following is valid correspondingly for other versions.

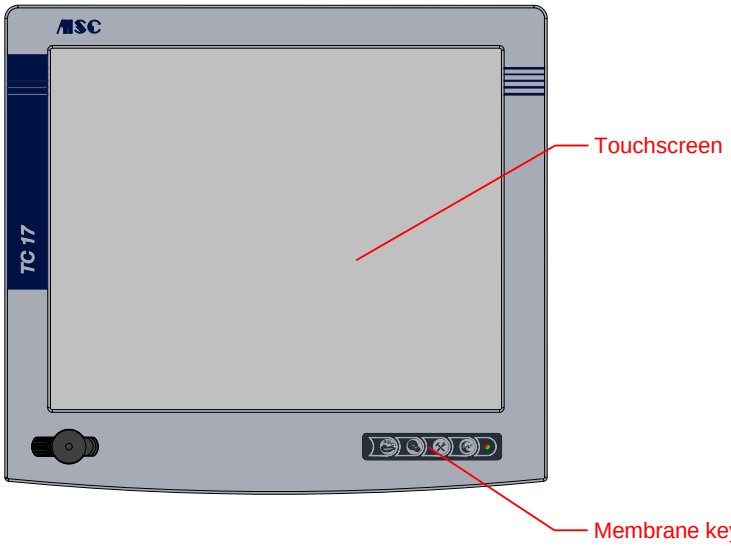


Fig. 3-6: Front view [e.g. TC17-S]

3.3.1 Membrane keyboard

The membrane keyboard on the front panel contains four function keys and the status LED.

Fig. 3-7: Membrane keyboard

Function keys

	Soft keyboard
	Touch calibration
	Tools - Configuring the device parameters. - Operating the user software.
	Stand by Pressing for more than 2 seconds causes a hardware reset.

Status LED

	red flashing = failure green = indication of operation alternately red-green flashing: "Stand by" mode (display out)

3.3.2 Touchscreen

The touchscreen is integrated in the display section of the front panel.

By touching the sensitive screen according to the represented functions on the display, you operate the computer, for example through pressure on an indicated field.

Notice:
Do not use any metallic or peaked objects –
these could damage the touch surface.

3.3.3 Cleaning

Switch off the TC and all devices connected to it, before starting the cleaning.

Notice:
Prerequisite for a proper maintenance of the device is that the device is cleaned regularly according to the following guidelines.

- It is allowed to use only pure water, if necessary with small additions of neutral detergents (pH 5-8). Where appropriate with the aid of smooth, not abrasive cloths, rags or industrial cotton wool. Violent rubbing is to be avoided.
- The removal of greasy, oily or sooty substances can be done with aromatic-free terpentine substitute or isopropyl alcohol (IPA). Remains of adhesives, silicone rubber or adhesive tapes etc. can be removed also in this way.
- It must not be used any solvents that contain esters, ketones, alcohols, aromatics, glycolic ether or halogenated hydrocarbons or the like.
- Avoid scraping and abrasive agents.
- Do not use any strongly acid or alkaline cleaning and wetting agents.
- Never use detergents of unknown composition.
- The detergents may have a maximum of 25 °C. Steam jet devices must not be applied.
- Immediately after every cleaning process, it is to be rinsed with pure cold water.

This page is left intentionally blank!

4 Operating system and Software

Software Version 1.03

4.1 Characteristics

The TC [Web] terminal system offers up to four connections simultaneously. Addressing the projected connections is carried out by the display manager. Integration in the application itself is necessary if ending an active connection is desired. With Web applications for instance, this can be solved via Java Script function 'ExitBrowser' respectively 'ExitWindow'.

If the connection shall be switched within an application it must be realized through the application such as for Web applications by switching to a different URL.

The terminal system can be started with two different operation modes:

- Manual connection
- Automatic connection

In addition, automatic connection features a timely delay, offering the user the opportunity to manually interfere at the starting point (e.g. for servicing).

The configuration level is selectable with the IP address of the terminal remotely by a Web browser. Thus the system can be differently projected even with automatic operation.

The TC [Web] terminal family is supported by three connection journals
(from software version 1.03):

- Web (incl. Java support)
- Virtual Network Computing (VNC)
- Remote Desktop (version 4 and 5)

All connection types can be operated with manual or automatic start. VNC and RDP are controlled at the point of connection establishment and during the established connection.

Connection monitoring can be configured with two different options:

1. Endless connection establishment
2. Connection establishment for n attempts

A waiting period should be configured between single attempts
to avoid unnecessary system load.

4.1.1 Switch-on behavior

The TC [Web] automatically starts booting after power is supplied and shows a green LED signal in the front.

Previously, the LAN connection has to be linked to the Ethernet interface for recognition while booting.

Keyboard and mouse can be connected to the USB ports if needed.
MIC input (mono) and audio line-out (stereo) are available for microphone and speaker.

There is no On/Off switch.

4.1.2 Booting process

The booting logo appears during the booting process. The display manager is initiated after switching into graphic mode. In basic condition of the device this is depicted as demonstrated in the window below.

Example: Display manager after booting

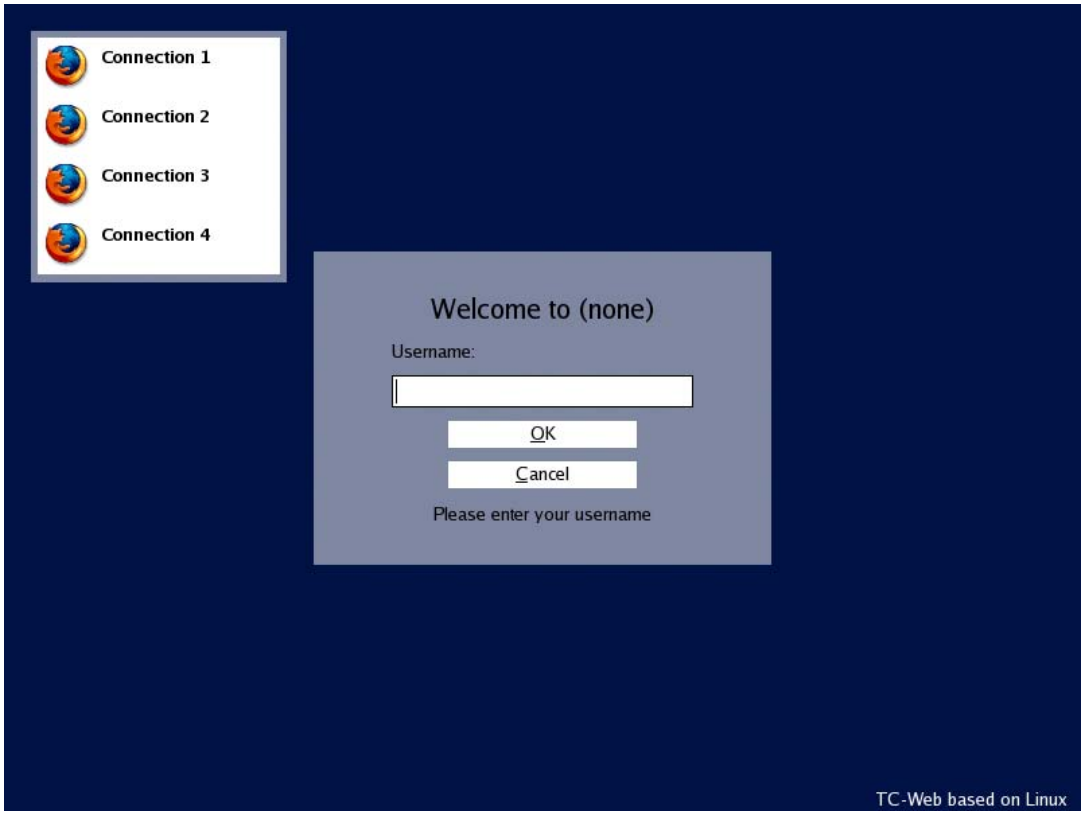


Fig. 4-1: Display manager after booting

4.1.3 Remote configuration

The configuration desktop can be accessed remotely during ongoing operation.
For this purpose a minimal Web server is integrated in every terminal system.

Remote access is carried out via following address syntax:

http://<IP>/cgi-bin/index

All configuration issues described in section "System configuration" in this chapter can be conducted via remote access.

Note:
Calibration can be accessed remotely, however, it must be conducted at the terminal itself.

The terminal will reboot after ending the configuration.

4.2 Operating elements

Choose between several options to operate the device:

- Four function keys
  in front, below the display
- Touchscreen
  integrated in display section
- Soft keyboard
  to be superimposed in the display
- Keyboard and mouse
  to be connected to the USB interfaces if required

4.2.1 Soft keyboard

	Fading in and out the soft keyboard mask.

Fig. 4-2: Soft keyboard

The keyboard layout is available in German and English (AE).
Switching languages occurs in the system configuration range.

4.2.2 Touch calibration

	Calibrating the touchscreen.

New calibration of the touchscreen occurs with execution of the dot-calibration which is prompted by the display. Storage occurs automatically.

Touch is already calibrated at delivery status.
Therefore usually no post-calibration by the user is necessary.

4.2.3 Tools

	Configuring the device parameters. **Operating the user software.**

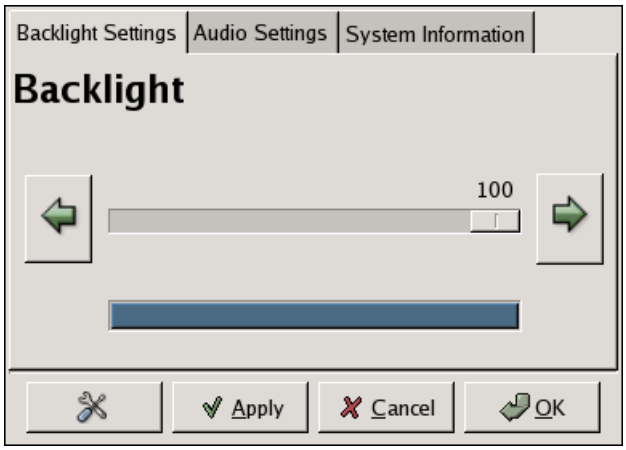


Fig. 4-3: Tools menu

4.2.4 Stand-by

	Turning on/off the signal.

Up to the present this function is not implemented.

4.3 System configuration

The system configuration contains all configuration screens necessary for the adaptation of the client system to the system infrastructure.

- Display
- Touch
- Network
- Passwords
- Update

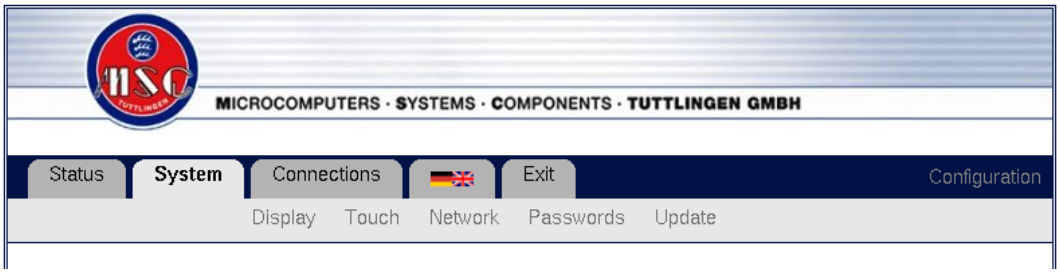


Fig. 4-4: System configuration

Value modifications of the individual part dialogues can be transferred with button 'Submit' or discarded with button 'Cancel'.

All pending modifications must be saved via 'Exit' in the menu item.

Fig. 4-5: Storing of modifications

The checkbox 'Save modifications' is visible only if modifications have been conducted.

If 'Exit' is put into action, a script will be started which updates the system configuration and reboots the TC.

4.3.1 Display

Following functions can be set in the menu item 'Display':

- Screensaver active/inactive
- Time to wait (in minutes) until the screensaver is being activated.
- Screensaver mode
- Brightness of back-lighting (0%..100%)

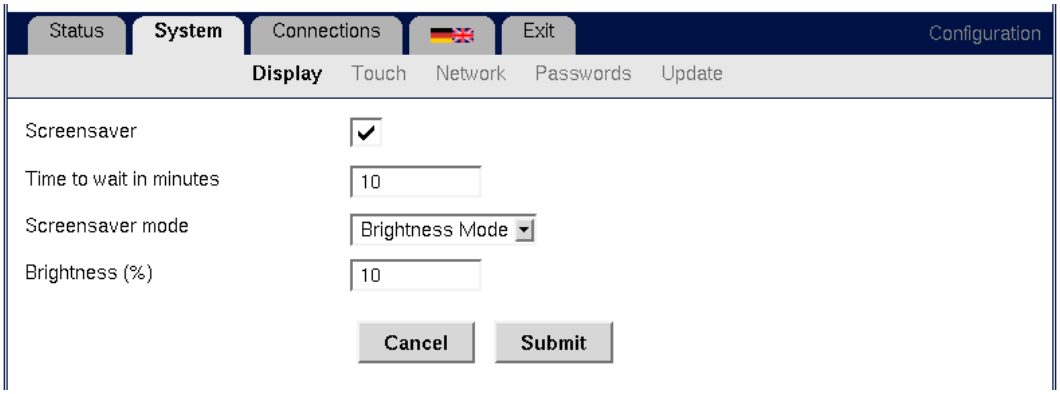


Fig. 4-6: Display – Settings

With function 'Screensaver mode', the behavior of the screen can be configured for longer idle periods. Two modes are being offered.

- 'Display Off'
  Screen will be turned off,
  can be activated again by pressing touchscreen.
- 'Brightness Mode'
  Back-lighting of display will be dimmed.
  The application is still visible.

4.3.2 Touch

Touch devices of the TC system family are provided with an analogue-resistive touch panel. The associated touch controller can be put into different operating modes.

- Normal operation (touch has full mouse functionality incl. Drag & Drop)
- Touch Down
- Touch Up
- Deactivated

Functionality of the "Right mouse button" can additionally be controlled by a time-out value in 'Normal operation' or 'Touch Down' mode.

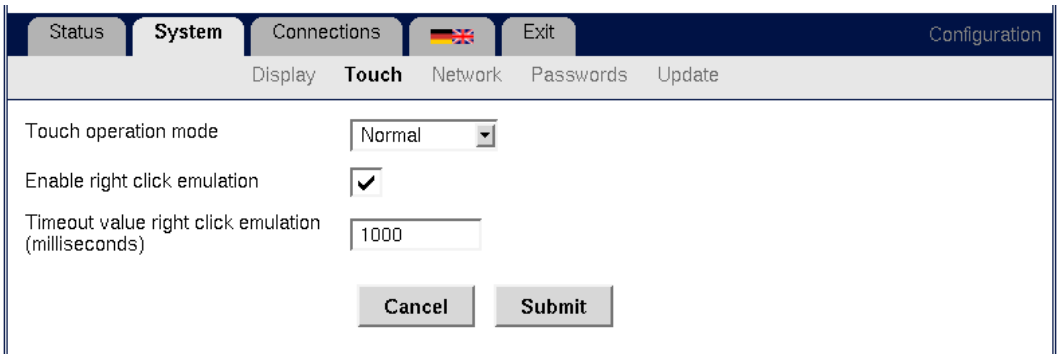


Fig. 4-7: Touch – Settings

Right mouse button simulating.
Works only if this function is supported by the application.

4.3.3 Network

Behavior of the TC in the net needs to be configured in menu item 'Network'.

The system can be used in the following operating modes:

- Automatic network configuration by DHCP
- Manual network configuration

Routing to different network segments can not be configured with the TC.

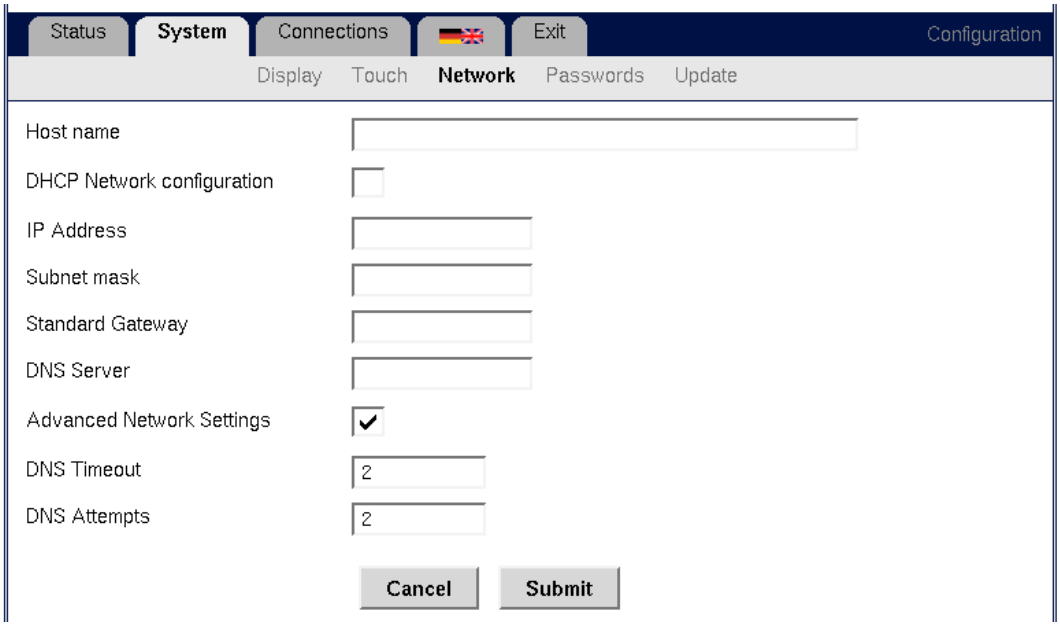


Fig. 4-8: Network – Configuration

The 'HOST name' can be assigned with both operating modes,
in DHCP operation it automatically can be transferred from the DHCP server.

Following values can be set for manual network configuration:

- IP Address
- Subnet mask
- Standard Gateway
- DNS Server

In case of network failure the reaction time can be optimized. The number of inquiry attempts at a DNS server can be set with the 'Advanced Network Settings' option for this reason: see 'DNS Attempts'. Waiting time between attempts can be set via 'DNS Timeout' parameter.

However, the reaction time in the network is subject to various factors so that the timeout value is not in accordance with the time value in seconds. It is rather a matter of a time period which is influenced by the actual network structure.

4.3.4 Pass words

The passwords for the individual connections can be entered in the menu 'Passwords'.

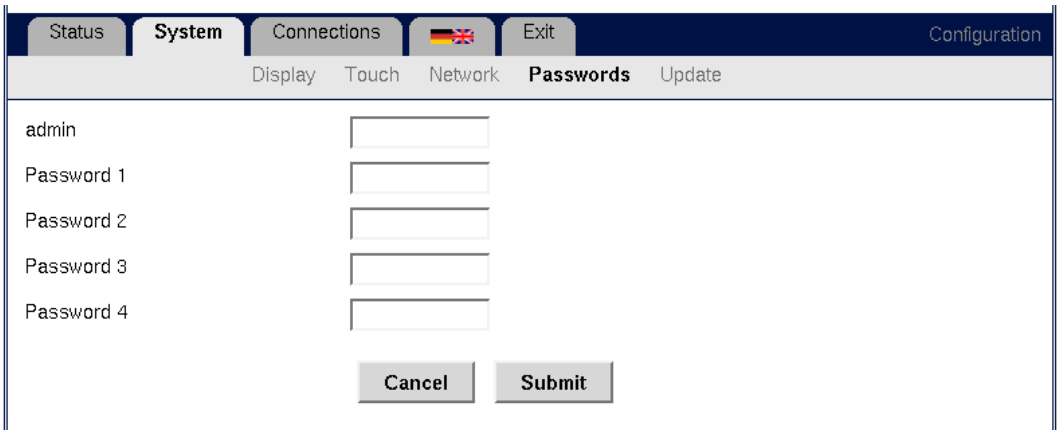


Fig. 4-9: Passwords – Entries

Default value for 'admin' – no password

4.3.5 Update

If desired, the system can be updated with an USB memory medium delivered by MSC Tuttlingen GmbH.

After inserting, the USB memory medium will automatically be mounted as drive. Select the update image with button 'Browse'.

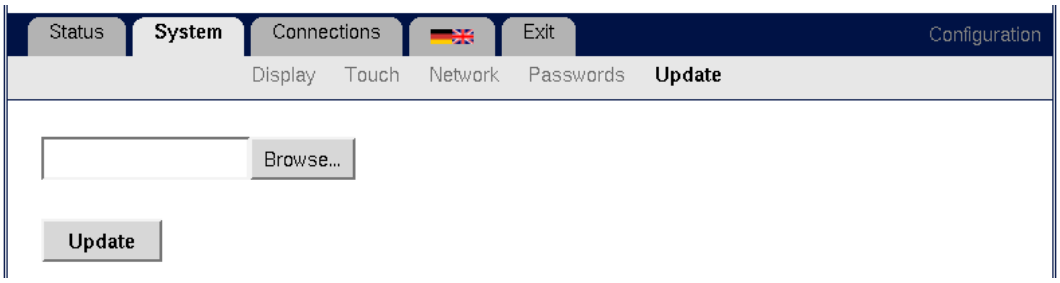


Fig. 4-10: Update – Select image and start mode

By pressing the button 'Update' the TC will go into update mode and will re-start. The system update will be conducted during the re-start.

4.3.6 Language setting

In this menu the language for the system configuration and the layout of the soft keyboard can be adjusted.

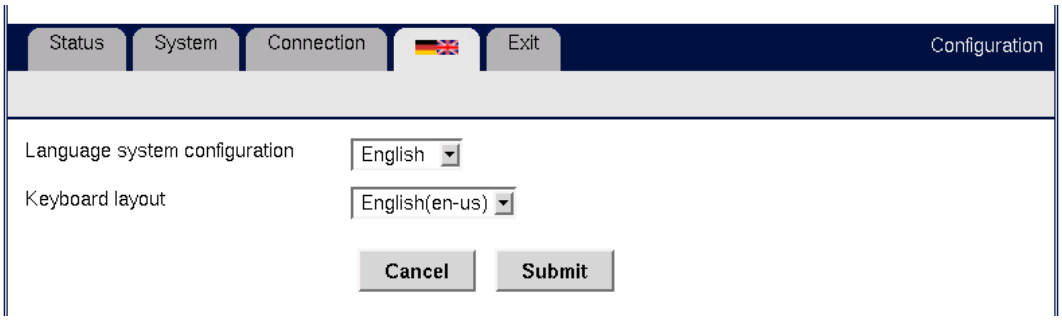


Fig. 4-11: Language setting

German and English

Presently language settings in German and English are available.

4.4 Connection establishment

Different establishment options:

- Manually
- Automatically
- Automatically with short waiting time

A connection must be projected in the connection configuration before it can establish a link to the server.

4.4.1 Manual connection establishment

At manual connection establishment the desired connection is selected in the display manager. After verifying the password with 'OK' the connection will be established.

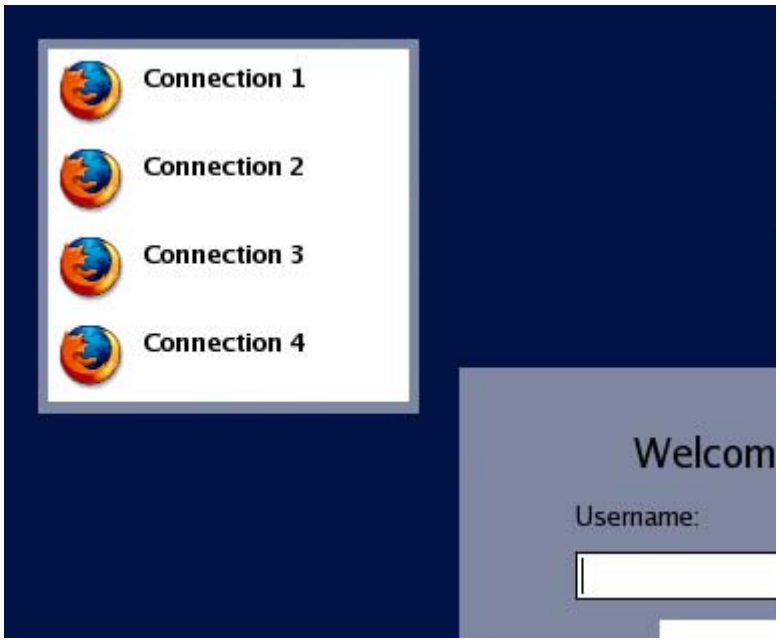


Fig. 4-12: Connection establishment

Connections must be set!

Further connections can be set via connection configuration as described in the appropriate section in this chapter. For this purpose, every entry needs a password.

It is not possible to maintain several connections simultaneously and switch back and forth.

Switching to other URLs must be realized in the Web application.

The password dialog must be verified with 'OK' even if no password is used.

4.4.2 Automatic connection establishment

With automatic connection establishment the system will try to activate the configured connection immediately after booting. If the connection fails, an error message appears.

Select following options here:

- New attempt to establish a connection
- Switching to system configuration
- Exit

If switching to another connection shall be possible despite automatic login (e.g. for servicing) it can be solved with time-controlled login. For this purpose, a timeout value will be configured after automatic login is started. During this timeout period the configuration or an alternative connection can be selected.

4.5 Connection configuration

Single connections are configured via following parameters:

1. Address
2. Connection type

In addition to connection types VNC and RDP the parameters

- connection attempts
- waiting time

will be allocated for the configuration of the control strategy.

If a different port as the standard port is used for the communication interface at the host computer, this port can be added with ':' separated from the address.

e.g. Web visualization via port 8080:

Address: http://192.168.100.27:8080/webvisu.htm

4.5.1 Web connection

Configuration parameter:

- Address / Port
- Automatic / Timed login

Fig. 4-13: Example for Web connection with 'Automatic login'

4.5.2 RDesktop connection (Windows Terminal Services)

Configuration parameter:

- Address / Port
- Automatic / Timed login
- Username
- Password
- Windows domain
- Connection retries
- Timeout monitoring

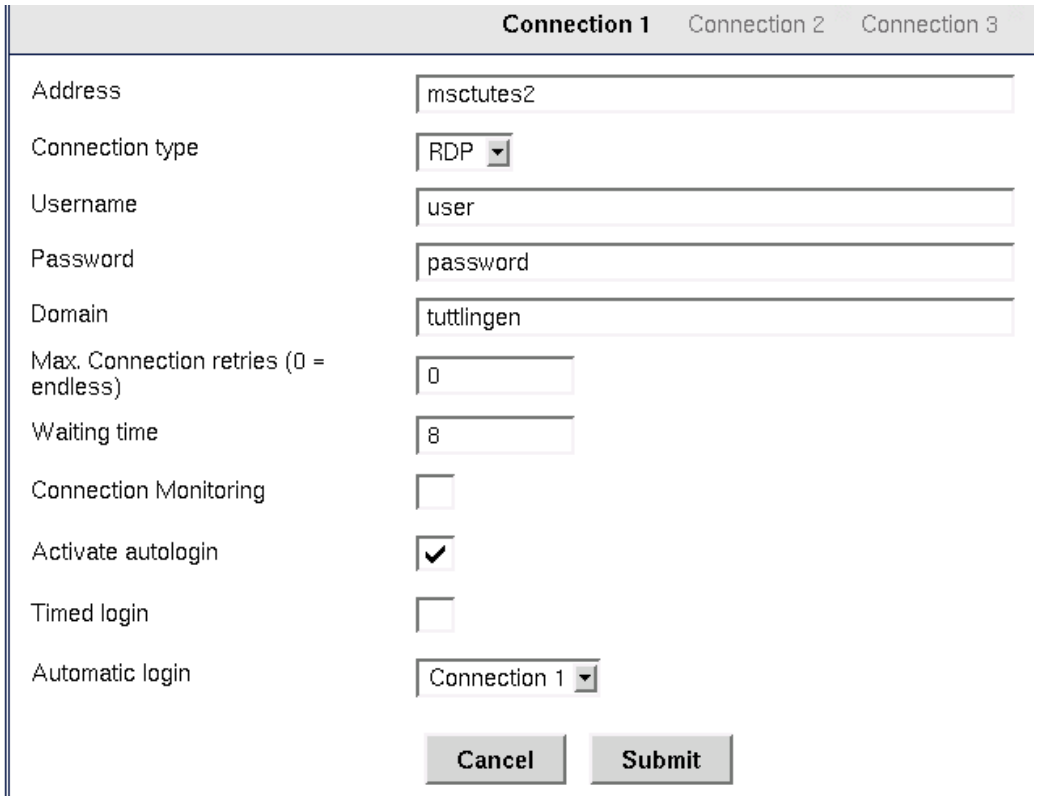


Fig. 4-14: Example for RDP connection

4.5.3 VNC connection

Configuration parameter:

- Address / Port
- Automatic / Timed login
- Connection retries
- Timeout monitoring

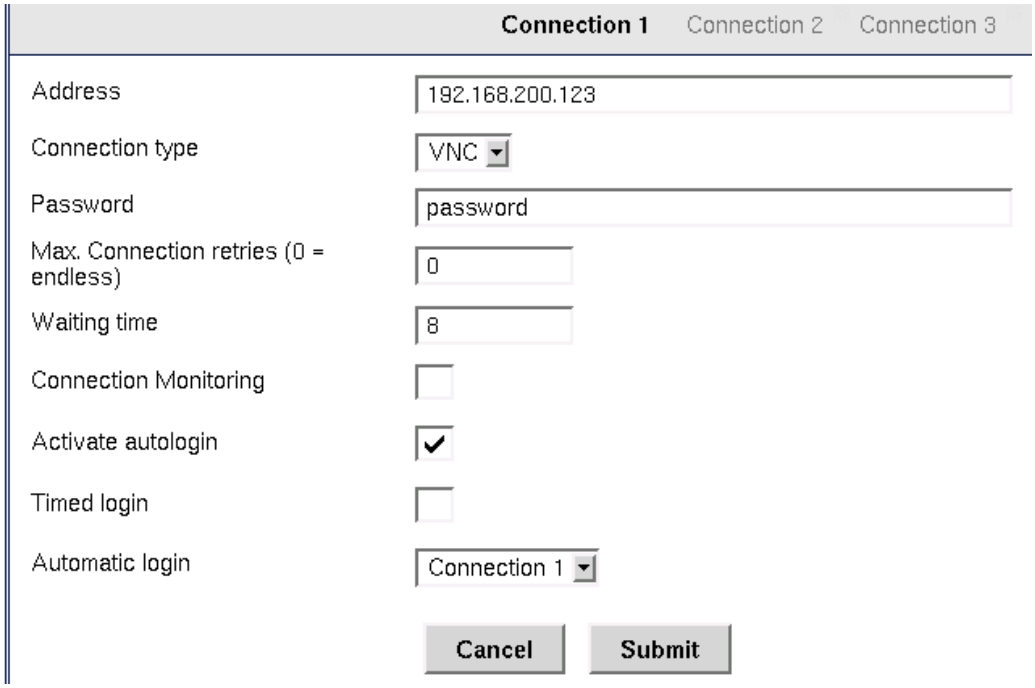


Fig. 4-15: Example for VNC connection

4.5.4 Configuring the VNC server

Following open source products can be applied if there is no VNC server installed on a Windows computer:

- Ultra VNC version 1.02
- TightVNC version 1.3.9

Please install these products according to the appropriate product documentation.

The screen update behavior of the server must be configured as follows to ensure correct transmission of quick data modifications at the main computer to the client.

Note:

Settings concerning the display update can influence the system performance substantially. Video Hook Drivers offered for each server product can have a positive impact on the system behavior.

However, the entire system must be adjusted individually.

Ultra VNC server

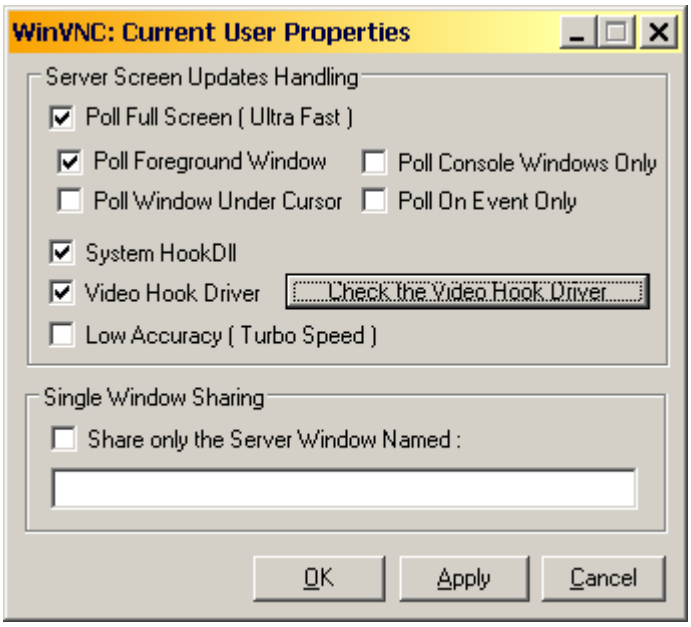


Fig. 4-16: Ultra VNC server

TightVNC server

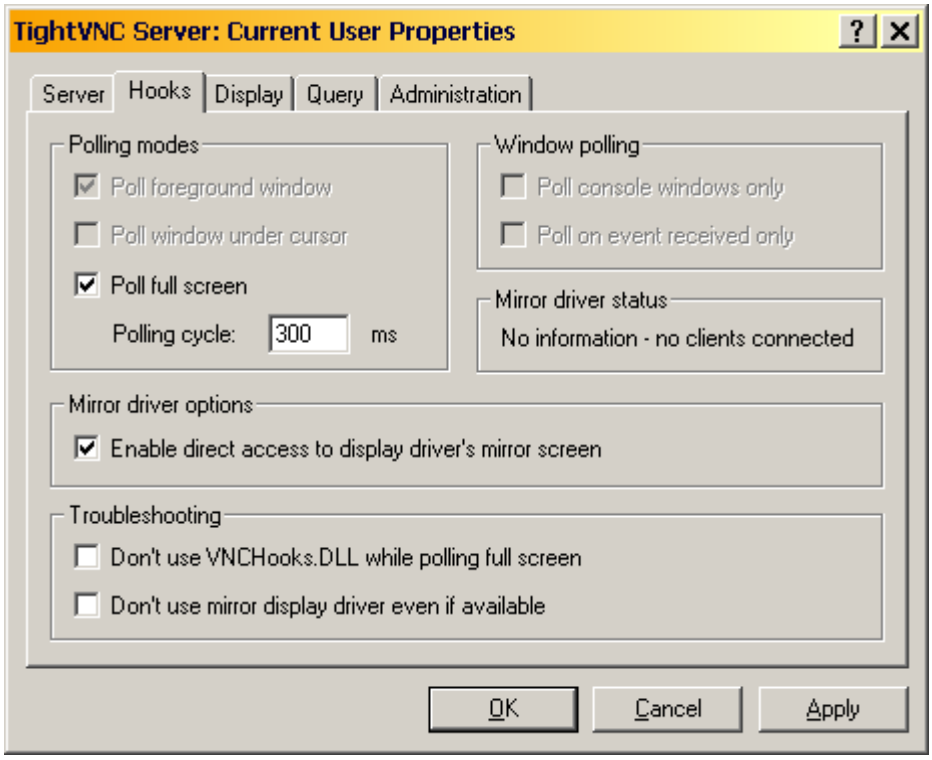


Fig. 4-17: TightVNC server

Note:
The value 'Polling cycle' can be adjusted for quick system alterations as well. Though this is not recommended in terms of higher system load.

This page is left intentionally blank!

5 Technical Data

5.1 General

Component	Description	Order code
Basic system		TC
Stand-alone	Add-on unit	-S
Protection class	IP 65 all-around	
Cooling	Fanless	
Housing well	Aluminum	
Rear-mounted part	Aluminum	
Mounting	Flange mounting for support arm or pedestal	
Front	Aluminum front panel, powder-coated surface	
	Membrane keyboard with 4 function keys	
	Status LED	
	printed in MSC design / silk-screen printing in RAL 5013 (cobalt blue)	/MSC
	neutral (without silk-screen printing)	/N
	customer-specific design	
Operating panel	Membrane keyboard with 4 function keys	-KT
	Touchscreen (analogue-resistive)	
Display Active matrix LCD TFT color	12.1" / SVGA / 800 x 600 pixel	/12,1
	17.0" / SXGA / 1280 x 1024 pixel	/17,0
Base board	Board for integration of CPU module at ETX form factor	
CPU on ET(e) module	Geode LX800	/LX-800
Memory extension	256 MB SDRAM	/256
Compact-Flash	512 GB CF card	
	Onboard graphics, shared memory	
External interfaces	2 x USB 2.0 at front, covering IP 65	
	2 x USB 2.0 at rear	
	1 x Ethernet 10/100 Base-T	
	MIC-Input (Mono) / Audio Line-Out (Stereo)	
Operating system	Operating system based on Embedded Linux	/Web

Supply voltage		24 VDC / 18..36 VDC (SELV) [1]
Power consumption		
typ.	Device with 12.1" display	30 W
	Device with 17.0" display	70 W
max.		75 W
Mechanical dimensions		depending on device variation (see chapter "Mechanical Dimensions")
Weight		depending on equipment (see section "Device-specific" in this chapter)
Ambient temperature		
Operation (vertical installation, with natural convection)		
Device with 12.1" display (basic type of configuration)		0 ºC to +50 ºC
Device with 17.0" display		0 ºC to +45 ºC
Storage		-20 ºC to +60 ºC
Relative humidity		50% max. at +40 ºC non condensing
		90% max. at +20 ºC non condensing
Ambient air		free of corrosive gases
Oscillation load (in operation)		according to EN 60068-2-6
10 Hz to 58 Hz		0.3 mm pp
58 Hz to 150 Hz		2 g
Shock load (in operation)		according to EN 60068-2-27
		15 g, 11 ms, 3 shocks
EMC directive 2004/108/EC		Testing for EC conformity
Interference emission		according to EN 55022:1998 + A1:2000 + A2:2003 Class A
Interference resistance		according to EN 55024:1998 + A1:2001 + A2:2003 and EN 61000-6-2:2001
Endurance test		24 h Burn-In
Test certificate		CE, UL-Recognized-Component

Notice: [1] The voltage applied must meet the requirements for a safe extra low voltage (SELV) according to EN 60950.

Component	Description	Article no.
Accessories	Adapter plate TC for VESA 100	6114674
	Adapter plate TC for Bernstein CS-2000 SL housing coupling	6114795
	Adapter plate TC for Rittal CP-S support arm system and ROSE GT48/2 flange (angle) coupling	6114796
	Connector housing TC for support arm systems according to VESA 100 standard / IP 65 [24 VDC and Ethernet / without USB]	6286137
	Connector housing TC for support arm systems according to VESA 100 standard / IP 65 [24 VDC and Ethernet / 1 x USB]	6286138
	Connector housing TC for support arm systems according to VESA 100 standard / IP 65 [24 VDC and Ethernet / 2 x USB]	6286139
	Pedestal TC VESA	6286141
	Pedestal TC connector housing	6286140
	Table power supply unit	6251119

5.2 Device-specific

Specific dates for different versions of the TC [Web] line are described in this section.

Version	Indication	Article no.	Order code	Front				CPU		Display			OS		Weight
				315x280 front panel membrane keyboard MSC 12.1" touch	315x280 front panel membrane keyboard neutral 12.1" touch	410x370 front panel membrane keyboard MSC 17.0" touch	410x370 front panel membrane keyboard neutral 17.0" touch	Geode LX800		12.1" TFT color, SVGA	17.0" TFT color, SXGA		Embedded Linux		Weight (standard) [kg], approx. [2]
Stand-alone	TC12-S LX800-S Linux														
	Front MSC	6309U39-1	TC-S-KT/LX-800/12,1/MSC/[1]/Web	x				x		x			x		4.95
	Front neutral	6309U39-2	TC-S-KT/LX-800/12,1/N/[1]/Web		x			x		x			x		4.95
Stand-alone	TC17-S LX800-D Linux														
	Front MSC	6309U40-1	TC-S-KT/LX-800/17,0/MSC/[1]/Web			x		x			x		x		7.95
	Front neutral	6309U40-2	TC-S-KT/LX-800/17,0/N/[1]/Web				x	x			x		x		7.95

[1] SDRAM: 256 MB
Compact-Flash card: 512 MB
see section "General" in this chapter.

[2] Weight with adapter plate, without connector housing on the rear

5.3 External connections

5.3.1 USB ports

4 pin USB connector, type A,
to connect USB peripheral devices.

USB Type A 4 pin	USB		Meaning
	1	VCC USB	Voltage supply
	2	USB–	Data
	3	USB+	Data
	4	GND	Ground

Fig. 5-1: USB

Note:
2 x USB 2.0 at front, covering IP 65
2 x USB 2.0 at rear

5.3.2 Ethernet connection

One Ethernet connection via 10Base-T connector "Ethernet".
The Ethernet controller supports transfer rates of 10 Mbit/s and 100 Mbit/s.

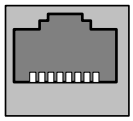
10Base-T RJ-45 CAT5	Pin	Signal	Meaning	Input/Output
	1	TxD+	10Base-T Transmit	Differential Output
	2	TxD–	10Base-T Transmit	Differential Output
	3	RxD+	10Base-T Receive	Differential Input
	4	N.C.	not connected	---
	5	N.C.	not connected	---
	6	RxD–	10Base-T Receive	Differential Input
	7	N.C.	not connected	---
	8	N.C.	not connected	---

Fig. 5-2: Ethernet

5.3.3 Microphone input and audio output

Two sockets for switchboard plug, each 3.5 mm, for microphone input (mono) and audio output (stereo).

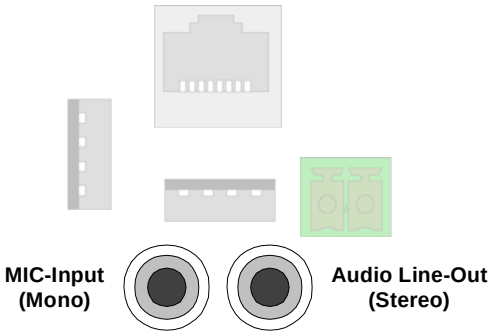
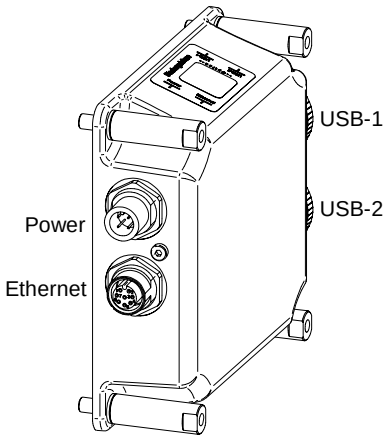


Fig. 5-3: Microphone input and audio output

5.3.4 Interfaces at the connector housing



Power

4 pin male connector to connect the 24 VDC supply voltage.

SACC-DSI-MS-4CON-L180 SCO Phoenix Contact / art no. 1553459	**Pin**	**Signal**
	1	+
	2	–
	3	–
	4	+
view plug side		

Fig. 5-4: Connector housing – Power

Recommended plug-in connector

Phoenix Contact

Art. no. 1681127	SACC-M12FS-4CON-PG7-M	4 pin, female	M12 unshielded	Screw connection standard
Art. no. 1694295	SACC-M12FS-4CON-PG 7-SH	4 pin, female	M12 shielded	Screw connection standard

Ethernet

8 pin socket to connect the Ethernet interface
and the 24 VDC supply voltage.

SACC-DSI-FS-8CON-L180 SCO Phoenix Contact / art no. 1542774	**Pin**	**Signal**
	1	+
	2	–
	3	–
	4	TxD–
	5	RxD+
	6	TxD+
	7	+
view female side	8	RxD–

Fig. 5-5: Connector housing – Ethernet

Recommended plug-in connector

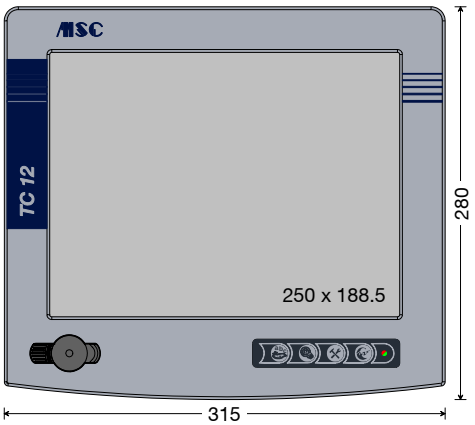
Phoenix Contact

Art. no. 1513334	SACC-M12MS-8CON-PG9-M	8 pin, male	M12 unshielded	Screw connection standard
Art. no. 1511857	SACC-M12MS-8CON-PG 9-SH	8 pin, male	M12 shielded	Screw connection standard

6 Mechanical Dimensions

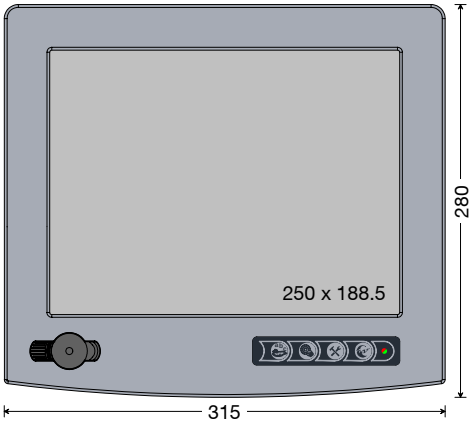
6.1 TC with 12.1" display

6.1.1 Front



- Front design MSC
- Stand-alone = Add-on unit
- 315 mm x 280 mm
- 12.1" display
- Membrane keyboard
  - 4 function keys
  - LED
- Touchscreen
- 2 x USB under covering

Fig. 6-1: TC12-S [MSC] – Front

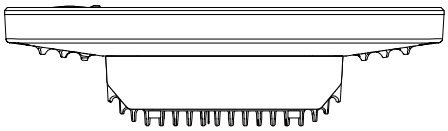


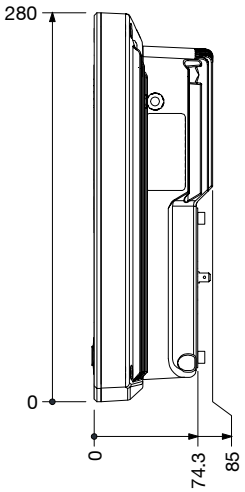
- Front design neutral
- Stand-alone = Add-on unit
- 315 mm x 280 mm
- 12.1" display
- Membrane keyboard
  - 4 function keys
  - LED
- Touchscreen
- 2 x USB under covering

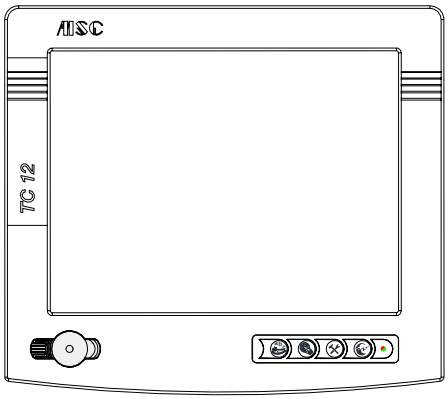
Fig. 6-2: TC12-S [neutral] – Front

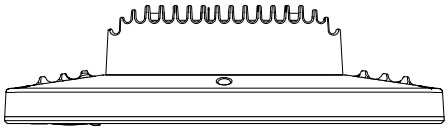
6.1.2 Device dimensions

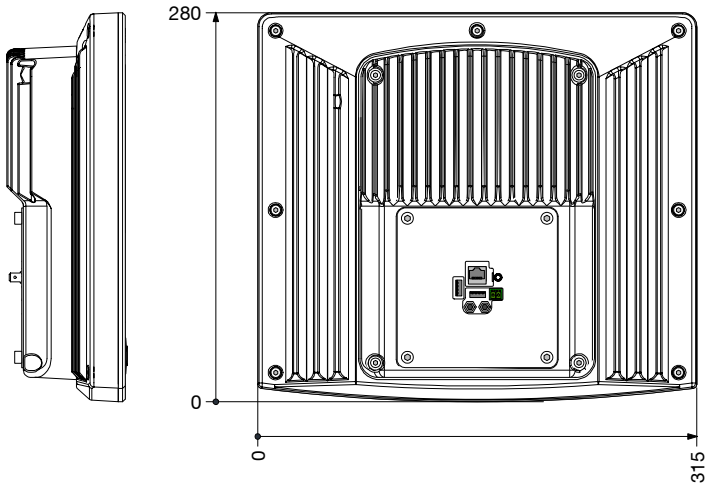
TC12-S [stand-alone]











General tolerances
ISO 2768 – mK

Fig. 6-3: TC12-S [stand-alone] – Device dimensions

Note: The mechanical dimensions of the TC12-S [MSC] and TC12-S [neutral] devices are identical. The figure shows TC12-S with MSC front design and the adapter plate for VESA 100, article no. 6114674, on the rear.

6.1.3 Adapter plate

Note:

When selecting a housing coupling (an equipment flange) it is to be ensured that the tube internal diameter is at least 40 mm.

For specific standard flange systems there are appropriate adapter plates in the scope of supply, see in this chapter the section "Adapter plates TC for standard flange systems".

Possible standard flange systems

Support arm system according to VESA 100 standard

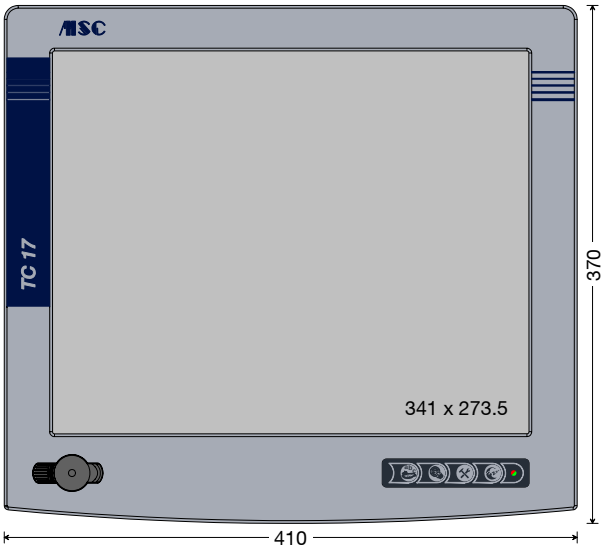
Rittal: CP-S support arm system

Bernstein: CS-2000 SL housing coupling

ROSE: GT48/2 flange (angle) coupling

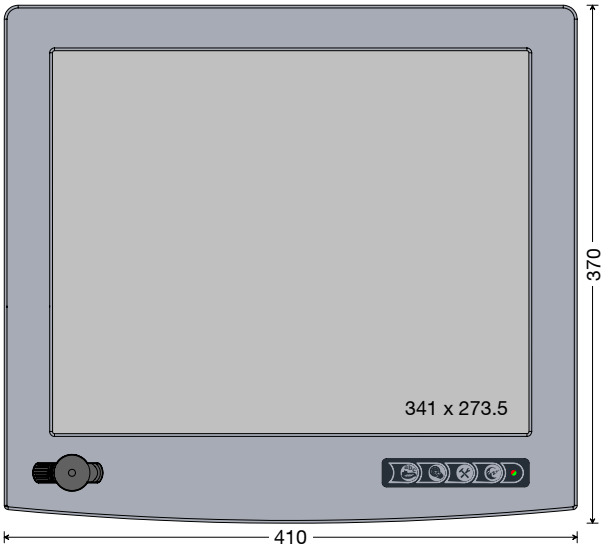
6.2 TC with 17.0" display

6.2.1 Front



- Front design MSC
- Stand-alone = Add-on unit
- 410 mm x 370 mm
- 17.0" display
- Membrane keyboard
  - 4 function keys
  - LED
- Touchscreen
- 2 x USB under covering

Fig. 6-4: TC17-S [MSC] – Front

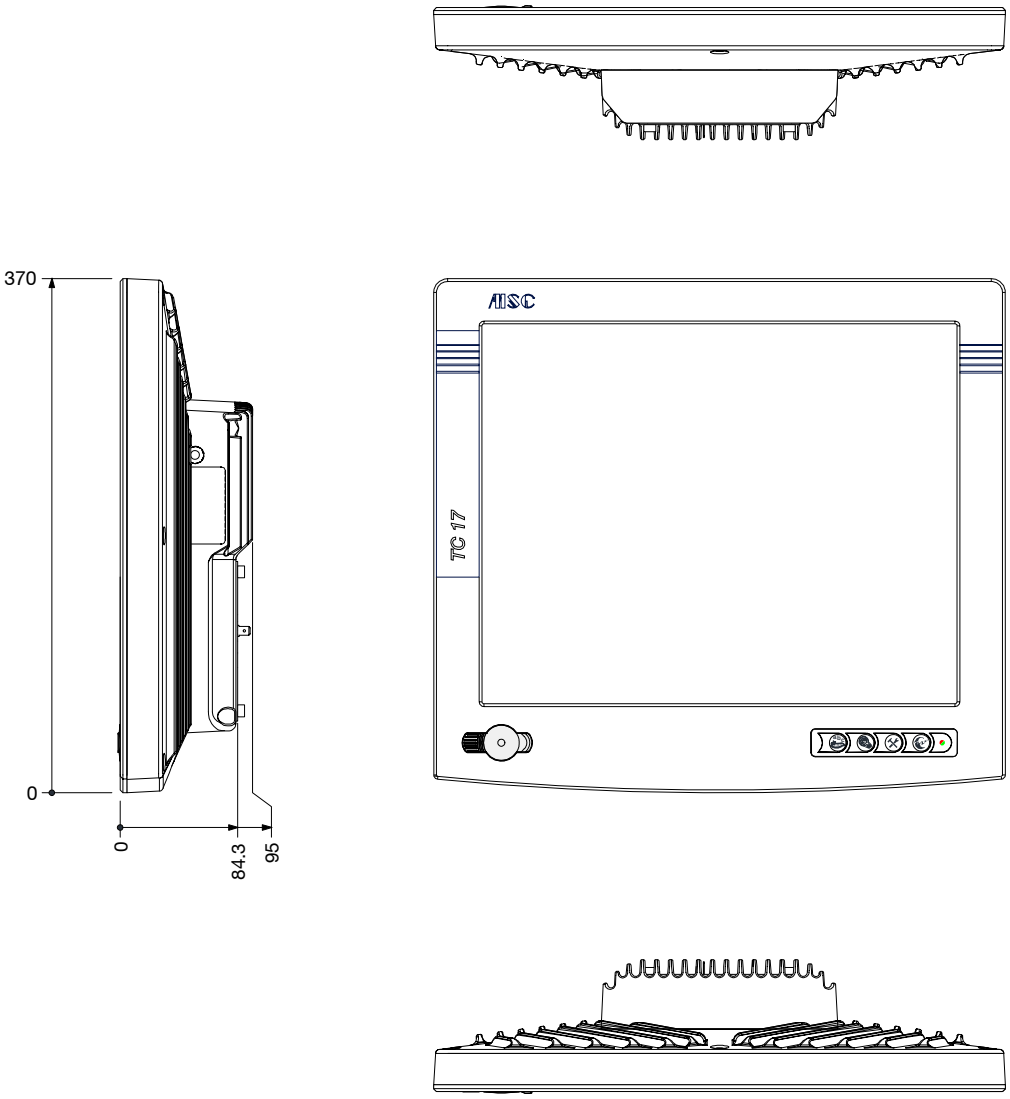


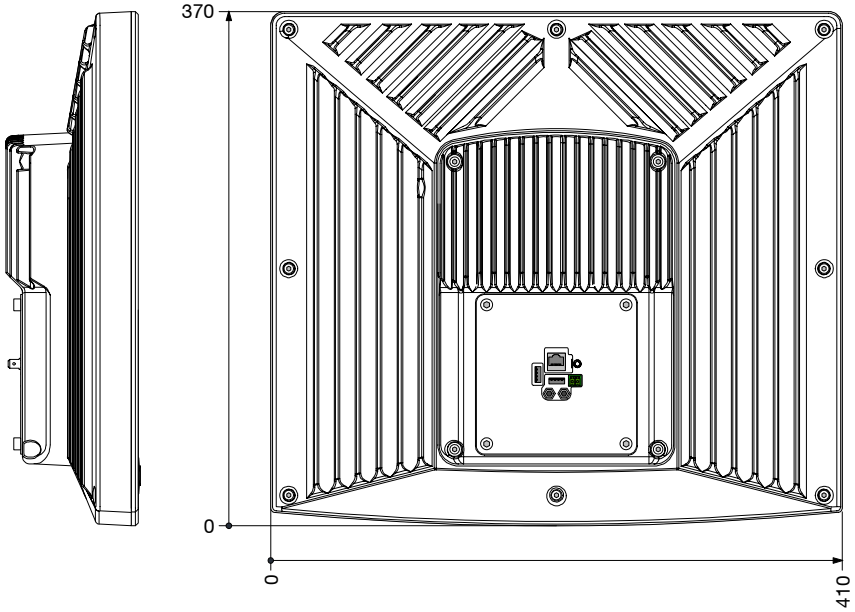
- Front design neutral
- Stand-alone = Add-on unit
- 410 mm x 370 mm
- 17.0" display
- Membrane keyboard
  - 4 function keys
  - LED
- Touchscreen
- 2 x USB under covering

Fig. 6-5: TC17-S [neutral] – Front

6.2.2 Device dimensions

TC17-S [stand-alone]





General tolerances
ISO 2768 – mK

Fig. 6-6: TC17-S [stand-alone] – Device dimensions

Note: The mechanical dimensions of the TC17-S [MSC] and TC17-S [neutral] devices are identical. The figure shows TC17-S with MSC front design and the adapter plate for VESA 100, article no. 6114674, on the rear.

6.2.3 Adapter plate

Note:

When selecting a housing coupling (an equipment flange) it is to be ensured that the tube internal diameter is at least 40 mm.

For specific standard flange systems there are appropriate adapter plates in the scope of supply, see in this chapter the section "Adapter plates TC for standard flange systems".

Possible standard flange systems

Support arm system according to VESA 100 standard

Rittal: CP-S support arm system

Bernstein: CS-2000 SL housing coupling

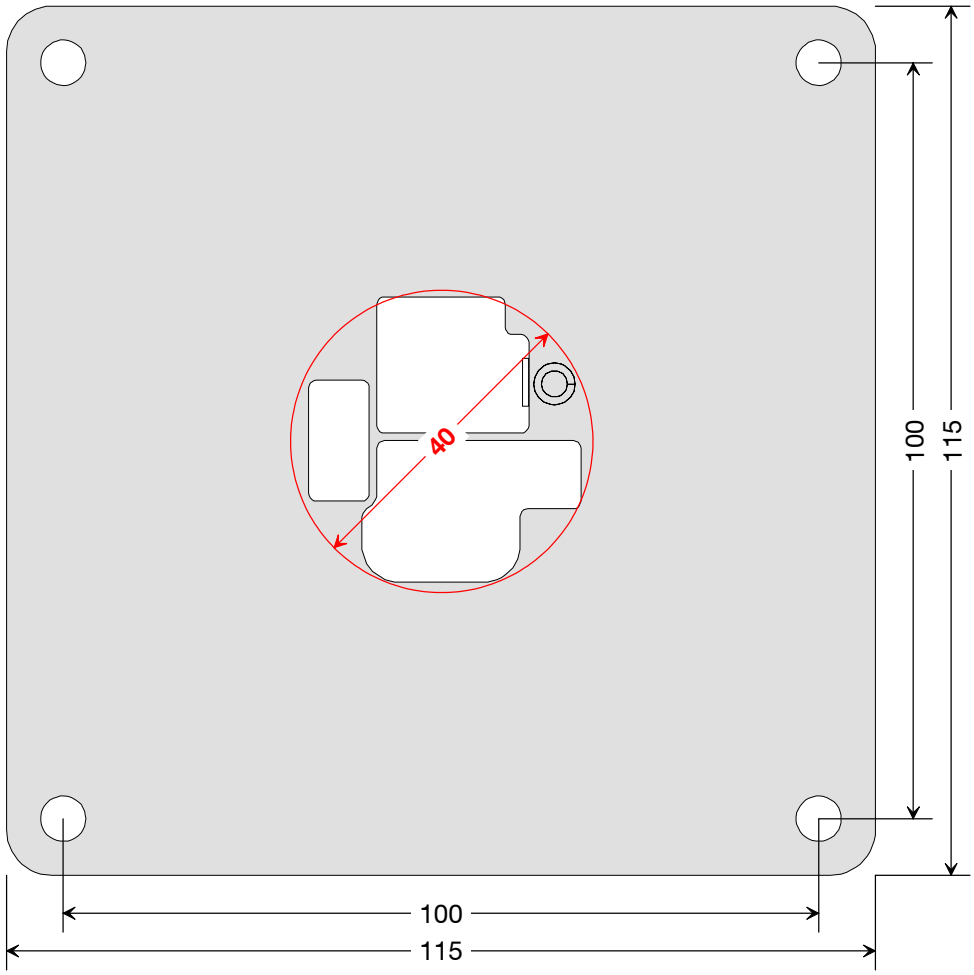
ROSE: GT48/2 flange (angle) coupling

6.3 Adapter plates TC for standard flange systems

For specific standard flange systems there are appropriate adapter plates in the scope of supply for TC12-S and TC17-S.

6.3.1 Support arm system according to VESA 100 standard

Article no. 6114674



Scale 1:1

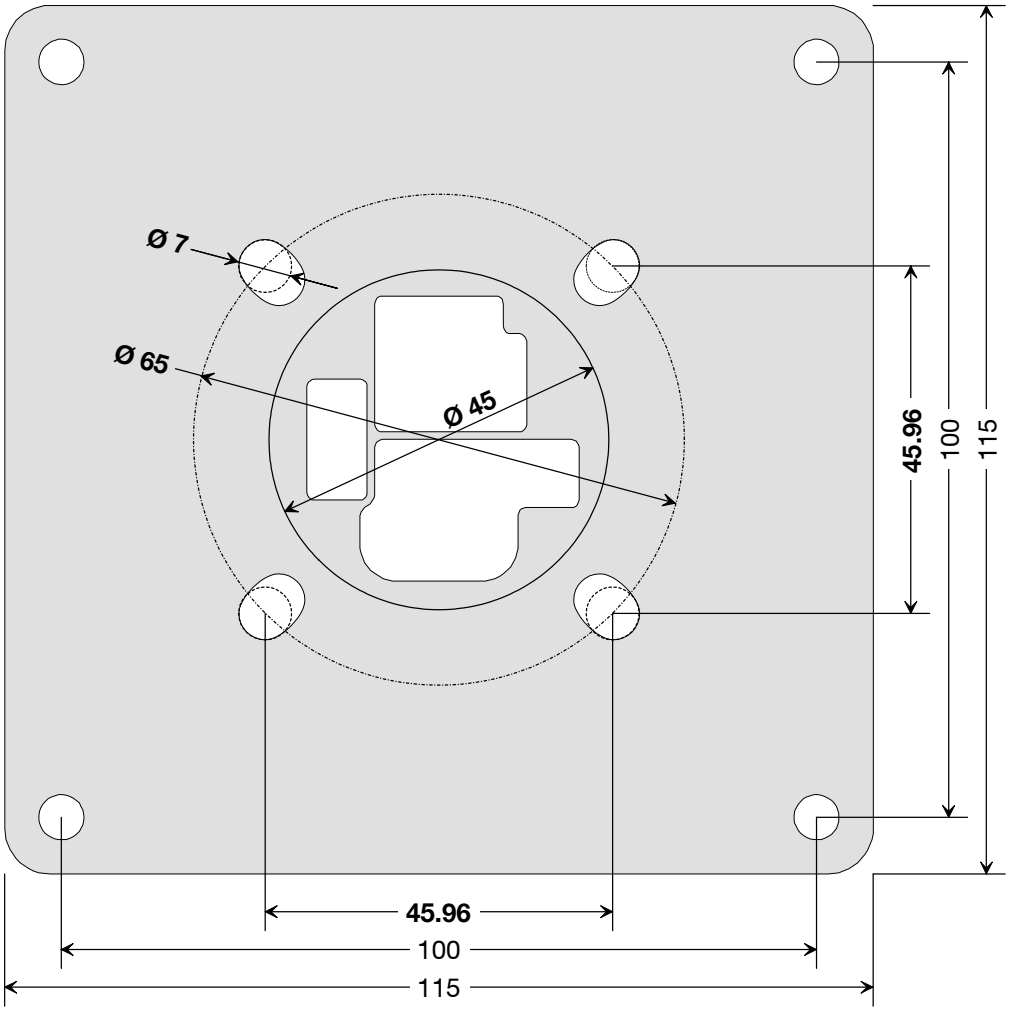
General tolerances
ISO 2768 – mK

Material thickness: 2.5 mm

Fig. 6-7: Adapter plate TC for support arm system according to VESA 100 standard

6.3.2 Rittal CP-S support arm system

Article no. 6114796



Scale 1:1

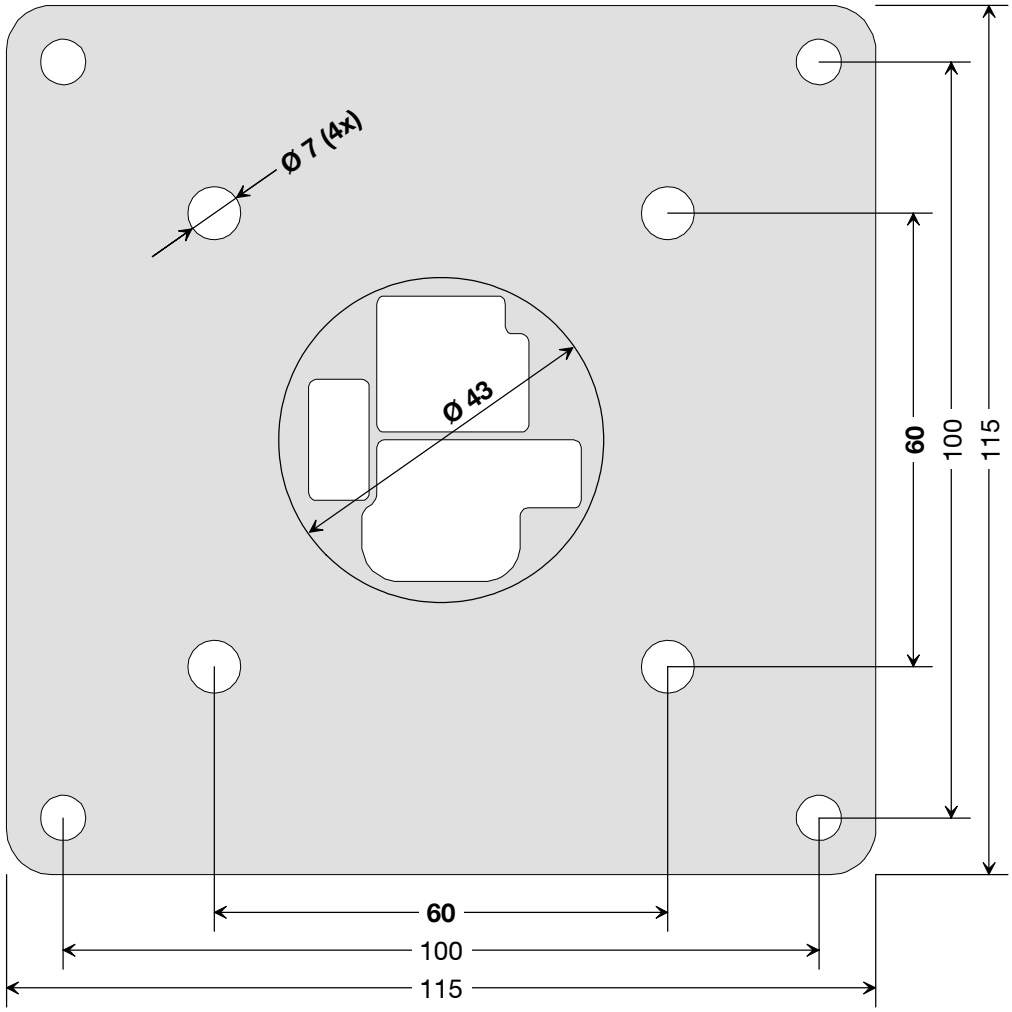
General tolerances
ISO 2768 – mK

Material thickness: 2.5 mm

Fig. 6-8: Adapter plate for Rittal CP-S support arm system

6.3.3 Bernstein CS-2000 SL housing coupling

Article no. 6114795



Scale 1:1

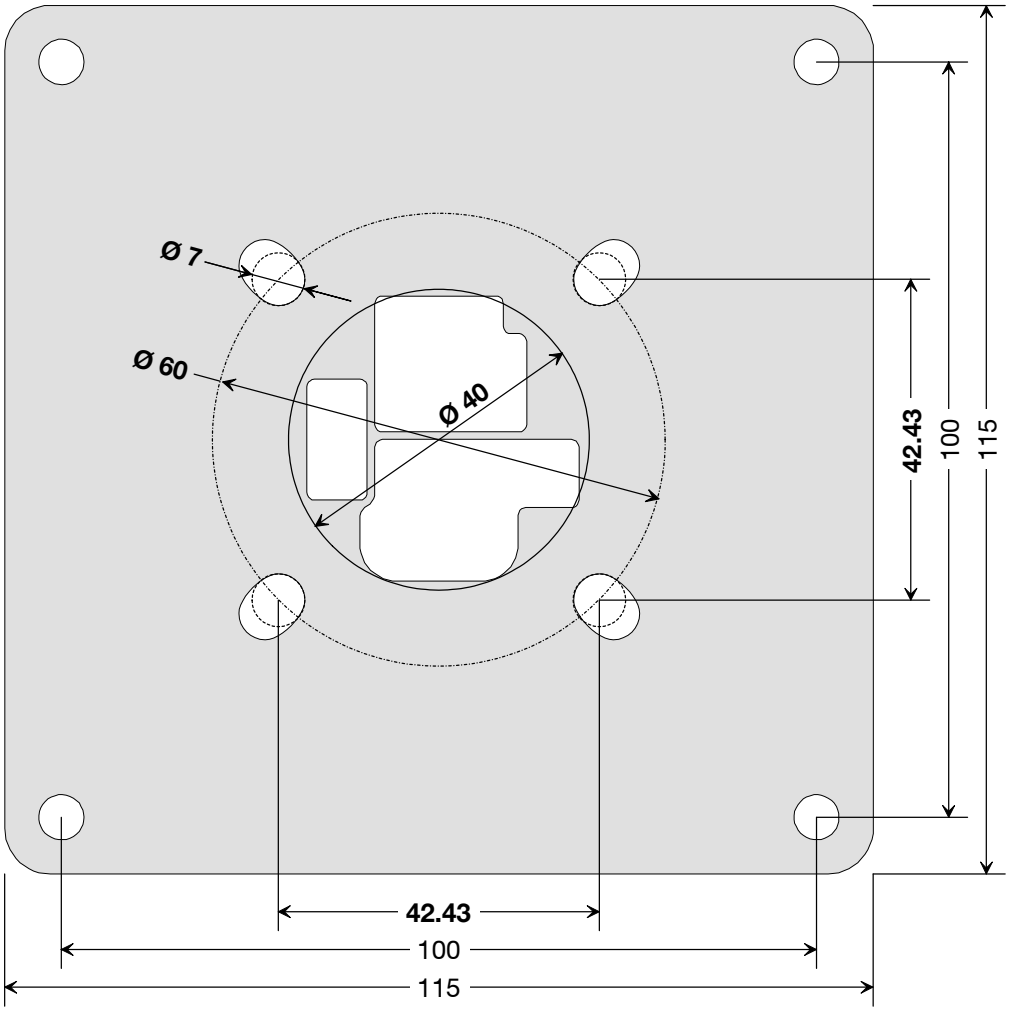
General tolerances
ISO 2768 – mK

Material thickness: 2.5 mm

Fig. 6-9: Adapter plate for Bernstein CS-2000 SL housing coupling

6.3.4 ROSE GT48/2 flange (angle) coupling

Article no. 6114796



Scale 1:1

General tolerances
ISO 2768 – mK

Material thickness: 2.5 mm

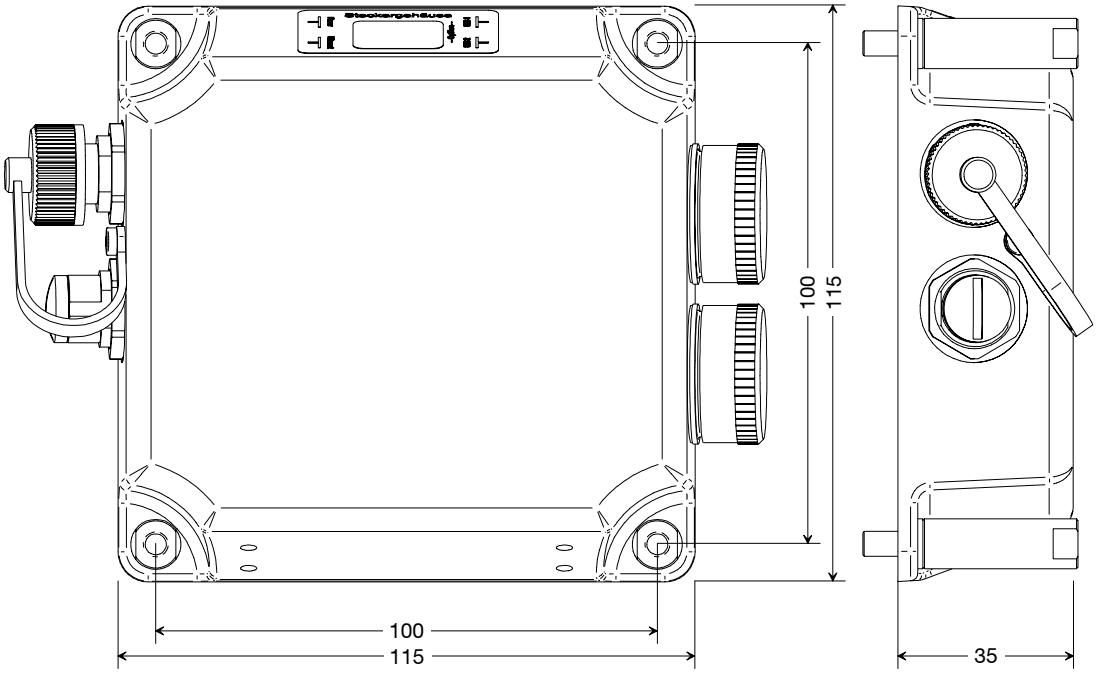
Fig. 6-10: Adapter plate for ROSE GT 48/2 flange (angle) coupling

6.4 Connector housing TC for support arm systems according to VESA 100 standard / IP 65

Example:

Connector housing TC with the connections 24 VDC and Ethernet / 2 x USB

Article no. 6286139



General tolerances
ISO 2768 – mK

Fig. 6-11: Connector housing TC for support arm systems according to VESA 100 standard / IP 65

Note: The mechanical dimensions of the different connector housings are identical. Only the number of the USB connections on the right-hand side is different.

6.5 Pedestal TC

Example:

Pedestal TC VESA

Article no. 6286141

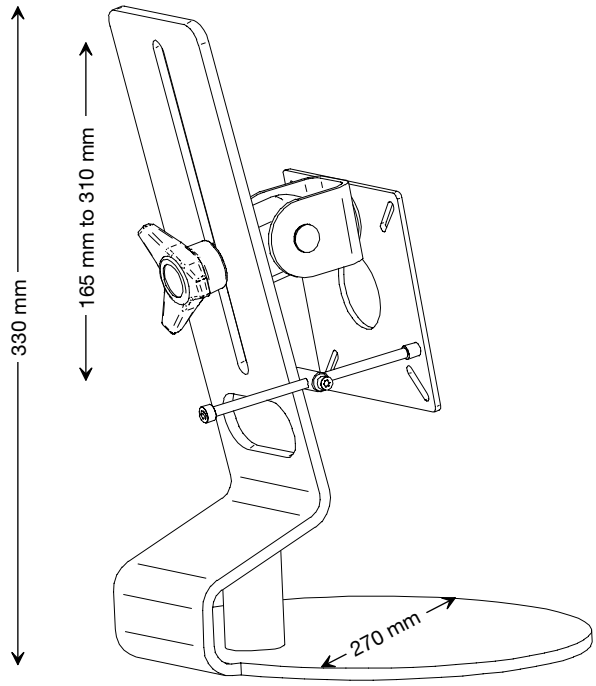


Fig. 6-12: Pedestal TC VESA

Note: The mechanical dimensions of the pedestal 'Connector housing' is identical. Only the adapter plate for the mounting at the TC is different.

Appendix

7 Licensing

7.1 Licensing regulations

7.1.1 Free software packages

The system software of the TC [Web] device generation includes the following function packages:

GRUB Bootloader Version 0.97

Linux Kernel 2.6.21.6

LibC Version 2.3

BusyBox 1.2.0

Automount 5.0.2

XOrg 7.1

Mozilla Firefox 2.0.0.10

VNC based on TightVNC 1.3.9

RDesktop 1.5.0

Sun Java SE Runtime 1.6 (1.5 / 1.4 optionally)

A detailed list of all modules can be inquired with your responsible sales commissioner.

Notice:

These programs were developed by third parties. If you want to use free software for more than the program sequence intended by MSC Tuttlingen GmbH, you can acquire rights of use from the authors or other initiators of this software in compliance with license regulations.

The source code of the free software with appropriate license texts and author notations can be inquired with your responsible sales commissioner within five years after acquiring this product.

7.1.2 General terms for disposal of software products

This software is protected by national and international copyright and contracts. Unlawful copying and distribution of this software or parts of it are liable to prosecution. This will result in prosecution according to civil and criminal law and lead to severe penalty and/or compensation for damages.

Please read the valid license regulations for this software before installation and use.

Every other use of this software is permitted with the appropriate system plattform of MSC Tuttlingen GmbH only.

7.1.3 Guarantee regulations for free software

The use of the free software included with this product, exceeding the program sequence intended by MSC Tuttlingen GmbH is subject to own risk. That means, no guarantee claims against MSC Tuttlingen GmbH can be raised.

MSC Tuttlingen GmbH offers no technical support for the product if the product is used with altered software. The listed license regulations include notes regarding the guarantee of authors and other lawful holders of the free software. Also, there are no guarantee claims against MSC Tuttlingen GmbH if a deficiency of the product rests, or could rest upon the fact that the user has altered the program or configuaration.

7.2 GNU General Public License (GPL) Version 2.0

GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.

51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software – to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Lesser General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you". Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program. You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

   a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

   b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

   c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

   These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it. Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

   In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

   a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

   b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

   c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

   The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

   If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

   If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

   It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

   This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

   Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.
12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

> <one line to give the program's name and a brief idea of what it does.>
>
> Copyright (C) <year> <name of author>
>
> This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.
>
> This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
>
> See the GNU General Public License for more details.
>
> You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA.

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

> Gnomovision version 69, Copyright (C) year name of author Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type 'show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than 'show w' and 'show c'; they could even be mouse-clicks or menu items – whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

> Yoyodyne, Inc., hereby disclaims all copyright interest in the program 'Gnomovision' (which makes passes at compilers) written by James Hacker.
>
> <signature of Ty Coon>, 1 April 1989
> Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License.

7.3 GNU Lesser General Public License (LGPL) Version 2.1

GNU LESSER GENERAL PUBLIC LICENSE

Version 2.1, February 1999

Copyright (C) 1991, 1999 Free Software Foundation, Inc.

51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software – to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages – typically libraries – of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

GNU LESSER GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

   A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

   The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

   "Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

   Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

   You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

   a) The modified work must itself be a software library.

   b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

   c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

   d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

      (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

   Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

   This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

   If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

   However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

   When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

   If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

   You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

   a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

   b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

   c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

   d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

   e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

   For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

   It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

   a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

   b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

    If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

    It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

    This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.
13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

    Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.
14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.
16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

> <one line to give the library's name and a brief idea of what it does.>
>
> Copyright (C) <year> <name of author>
>
> This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version.
>
> This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.
>
> You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

> Yoyodyne, Inc., hereby disclaims all copyright interest in the library 'Frob' (a library for tweaking knobs) written by James Random Hacker.
>
> <signature of Ty Coon>, 1 April 1990
> Ty Coon, President of Vice

That's all there is to it!

7.4 BSD Copyright Notation

Copyright (c) 1988, 1989, 1991, 1994, 1995, 1996, 1997

The Regents of the University of California. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that: (1) source code distributions retain the above copyright notice and this paragraph in its entirety, (2) distributions including binary code include the above copyright notice and this paragraph in its entirety in the documentation or other materials provided with the distribution, and (3) all advertising materials mentioning features or use of this software display the following acknowledgement: "This product includes software developed by the University of California, Lawrence Berkeley Laboratory and its contributors." Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

7.5 ZLib Copyright Notation

Copyright notice:

(C) 1995-2004 Jean-loup Gailly and Mark Adler

This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software.

Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

Jean-loup Gailly Mark Adler

jloup@gzip.org madler@alumni.caltech.edu